

FORESTRY ABSTRACTS

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ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

TRANSLATIONS

See Nos. 3353, 3369, 3384, 3395, 3400, 3417, 3424, 3505-6, 3531, 3540.

0 (02). HANDBOOKS. MANUALS. TEXTBOOKS

2580. PERRIN, H. *Sylviculture*. Tome II. Le traitement des forêts: théorie et pratique des techniques sylvicoles. [Forestry. Vol. 2: Treatment of the forest: theory and practice of silvicultural techniques.] École Nationale des Eaux et Forêts, Nancy. 1954. pp. xi + 411 + 17 plates. 599 refs. [F.]

This volume deals with silvicultural systems—(1) high forest, (2) coppice, (3) coppice with standards, (4) transitory systems leading to conversion, all with reference to conditions in France, (5) treatment of Mediterranean forests. Section (6) deals summarily with marking, the organization of felling operations, transport etc. Vol. III will deal with tending. [Cf. *For. Abstr.* 14 (No. 2960).]

0 (038). DICTIONARIES

See Nos. 2675, 2697-8.

0 (048.1). BIBLIOGRAPHICAL LISTS

See also No. 2707.

2581. PISARSKA, M. Przegląd piśmiennictwa leśnego w okresie 10-lecia Polski Ludowej. [Survey of forest literature during the first decade of the People's [Republic of] Poland.] *Sylvan* 98 (6), 1954 (472-82). [Pol.]

Annotated lists of books and periodicals published during the period 1945-55.

0 (05). PERIODICALS. YEARBOOKS. DIRECTORIES. ALMANACS. CALENDARS. DIARIES

See also Nos. 2581, 3697.

2582. *Angewandte Pflanzensoziologie*. Zentralstelle für Vegetations-Kartierung, Stolzenau/Weser, Germany. Price not given.

A new series of occasional publications, beginning 1951, under the general editorship of R. Tüxen, presenting the results of work in applied plant sociology and vegetation mapping by the Zentralstelle. Citation in *For. Abstr.*: *Angew. PflSoziol., Stolzenau*.

2583. *Merkblätter*. Institut für Forstwissenschaften, Eberswalde (Abteilung Forstschutz gegen tierische Schädlinge).

Each of this series consists of 4 to 14 pages with illustrations, and deals with some animal or insect pest. No. 1 appeared in Jan. 1952 and ten or twelve will be published each year. Citation in *For. Abstr.*: *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutz tier. Schäd.)*.

2584. *Prace Instytutu Technologii Drewna*. Instytut Technologii Drewna, Ministerstwo Leśnictwa, Poznań. Price of the first issue Zł.12. P.R.

The first issue 1 (1), 1954 of this series [Papers of the Institute of Wood Technology] contains 74 pages (4 papers in Polish with Russian and English summaries, and 19 abstracts of Polish, Russian and German papers). Abbreviation in *For. Abstr.*: *Prace Inst. Tech. Drewna*.

2585. *Études du Comité consultatif des Reboisements*. Direction Générale des Eaux et Forêts, Paris.

The series presents recommendations on afforestation in France by the Committee established in 1951 for this purpose. Nos. 1-7 were published in 1953-54, at Fr.50 each and are obtainable from the École Nationale des Eaux et Forêts, Nancy. Abbreviation in *For. Abstr.*: *Étud. Com. consult. Rebois., Paris*.

2586. *Forest Insect and Disease Newsletter for the Southeast*. Southeastern Forest Experiment Station, Asheville, N. Carolina.

The series is intended to inform foresters and timberland owners of current insect and disease conditions in Virginia, N. and S. Carolina, Georgia, Florida, and eastern Tennessee. No. 1, January 1955, surveys conditions during 1954. Abbreviation in *For. Abstr.*: *For. Insect Dis. Newslett. Stheast*.

0 (084.3/.4). MAPS. ATLASES

See also No. 2806.

2587. Carte des sols et de la végétation du Congo Belge et du Ruanda-Urundi. [Map of the soils and vegetation of the Belgian Congo and Ruanda-Urundi [parts].] Institut pour l'Étude Agronomique du Congo Belge, Bruxelles. 1954. [F.]

Nos. 2, 4 and 6, by various contributors, cover the following, mostly on a scale of 1:50,000: (2) *Mvuazi (Bas-Congo)*—soil and vegetation maps, plus text (pp. 40). (4) *Nioka (Ituri)*—soil, vegetation, erosion and land utilization maps, plus text

(pp. 31; 3 refs.), and geomorphological maps and sections (bedrock, surficial sediments, erosion surfaces, land profiles), plus text (pp. 27; 19 refs.). (6) *Yangambi, sheet 1: Weko*—soil and vegetation maps, plus text (pp. 23; 6 refs.).

0 - - 011. TERMINOLOGY. NOMENCLATURE

See Nos. 2675, 2697-8, 2708, 3318-9.

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.2. Radiation and Temperature

See also No. 2592.

2589. SUZUKI, T., and SATOO, T. [An attempt to measure the daylight factor under the crown canopy, using a solid angle projecting camera.] *Bull. Tokyo Univ. For.* No. 46, 1954 (169-80 + 4 plates). 7 refs. [Jap.]

Trials of the instrument (designed by K. Watanabe for use indoors) in the experimental forest of Tokyo University proved time-consuming and results were not always accurate.

111.5. Wind

See Nos. 3018, 3088.

111.7. Humidity, Evaporation. Clouds etc. Precipitation

See also section 116 and Nos. 2592, 3018, 3092.

2590. BROWN, A. A. The significance of weather modification to a forester. *J. For.* 52 (12), 1954 (899-90). 3 refs.

A review of the present position and future prospects, including the cautious conclusions of the American Meteorological Society (1953). The author holds that continuing observations should make it possible to define the exact conditions in which cloud seeding can have the desired local effect.

2591. HAMILTON, E. L. Rainfall sampling on rugged terrain. *Tech. Bull. U.S. Dep. Agric.* No. 1096, 1954. pp. 41. 31 refs. Price 20 cents.

111.8. Climatology. Climate and Microclimate

See also Nos. 2696, 2791, 2800-2, 2807, 2811, 2981, 3018, 3171, 3239.

2592. VAARTAJA, O. Temperature and evaporation at and near ground level on certain forest sites. *Repr. from Canad. J. Bot.* 32, 1954 (760-83). 15 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 156.)

Microclimate, especially temperature extremes, was studied on various Pine and Spruce sites in Finland. Thermo-element measurements were made on clear, calm summer days. Comparisons showed that the climate of exposed sites differed greatly

0 - - 014. CLASSIFICATION

2588. O klasifikaciji stručne literature. [Classification of special literature.] *Drvena Industrija, Zagreb* 6 (1/2), 1955 (20-3). [Croat.] P.R.

A brief discussion of the UDC and the Oxford system of decimal classification for forestry, followed by the full text (in Croatian) of Kollmann's classification for wood technology used at the Timber Industry Research Institute at Zagreb.

from that of sites with protective ground vegetation or canopy. Very large temperature differences between the sites existed at ground level and moderately large differences at the 5- and 20-cm. levels. On exposed sites a temperature range of 57° C. in 24 hours was recorded in sandy surface soil, and still larger ranges seemed probable. Extreme diurnal fluctuation in temperature is evidently not closely correlated with general climate; it is favoured by dryness of the soil and presence of ground cover, such as humus and fine litter, with low thermal conductivity. Maximum temperatures of 50° to 70° C. are considered of normal occurrence in thin surface soil on exposed sites in large areas of northern coniferous forest. At the same time, maximum temperatures may remain from 9° to 13° C. under the protection of canopy and surface cover, and night minima may be below 0° C. in thin surface soil. A negative correlation was found between evaporation rate and drought injuries of plants on dry sites. Root competition was more important to plants than evaporation conditions, at least as shown by measurements from large vessels. *From author's abstract.*

114. Soil. Soil Science

114.1. Soil Physics

See also Nos. 2741, 2743-50, 2977.

2593. GUPTA, R. S. Some interesting soil data on compactness, erodibility, and other morphological features in Sal forests, miscellaneous forest and taungya [plantation] in Dehra Dun. *Indian For.* 81 (1), 1955 (48-50). 2 refs.

In this investigation, Brinell's hardness number, erodibility, penetrability, and apparent density, at different depths of soil were determined *in situ* in (1) Sal [*Shorea robusta*] forest, (2) miscellaneous forest, and (3) taungya plantation. In (1) and (2), hardness of topsoil was greater than that of subsoil, but in (3) it was less. In (3), cultivation and exposure cause hard pan to develop at a depth of 5-12 in., which diminishes subsoil water seepage and reserve and increases erodibility in the topsoil. The data are tabulated.

114.2. Soil Chemistry

See also Nos. 2606, 2608, 2614-5, 2646, 2743-6, 2748-58, 2821.

2594. VLASJUK, P. A., and ZIMINA, V. A. Soderžanje podvižnyh form mikroelementov cinka i

bora v počvah USSR. [The content of readily available forms of the trace elements zinc and boron in soils of the Ukrainian S.S.R.] *Počvoved.* 1954 (5), (11-26). 10 refs. [Russ.russ.] A.P.B.

Deals with the relation of readily available Zn and B contents in the soils to those in the parent materials, and their distribution by genetic horizons and soil types. Includes some data for forest soils (sod-podzolic, grey and dark-grey forest soils).

2595. TARRANT, R. F. Effect of slash burning on soil pH. *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 102, 1954. pp. 5. 4 refs.

The following results were obtained in studies (over 3-4 years) in Washington and Oregon: (1) significant differences in soil pH were found between unburnt and lightly burnt, unburnt and severely burnt, and between lightly and severely burnt sites; (2) pH decreased significantly with increasing time since burning; (3) pH decreased more with increasing time since burning on lightly than on heavily burnt areas; (4) no significant differences in pH were found between unburnt soil in the clear-cut area and undisturbed soil in adjacent forest; (5) intensity of burning is not uniform over a clear-cut area, nor is the entire area directly affected by the fire; in one area only 1% was severely burnt, in another 4% was lightly burnt while 49% was unburnt.

2596. FROMENT, D. Quelques résultats au sujet du pH et du pouvoir tampon de la litière de différentes essences forestières. [Some results concerning pH and buffer action of the litter of different forest species.] *Bull. Inst. agron., Gembloux* 22 (3/4), 1954 (287-9). 2 refs. [F.] E.M.B.

Presents in classified form the results of investigations on 46 spp.

2597. DUCHAUFOR, P. Essai d'ammonification et de nitrification de différents humus forestiers. [Laboratory experiments on the ammonification and nitrification of different forest humus.] *C.R. Acad. Sci., Paris* 239 (16), 1954 (998-9). 1 ref. [F.] O.R.S.

Cf. *For. Abstr.* 15 (No. 1039).

2598. DUCHAUFOR, P. Propriétés des complexes humiques dans différents types de sols. [The properties of humic complexes in different types of soil.] *Ann. Éc. Eaux For. Nancy* 14 (1), 1954 (41-65). 19 refs. [F.e.g.]

Describes a method of fractionating humus complexes based on the differences between their physical properties, especially their degree of dispersion and the nature of their association with the mineral colloids. Three fractions are distinguished: (1) the 'pre-humic complexes', which are dispersed and, unlike the true humic acids, are soluble in acetyl bromide, by which means they can be quantitatively assessed; (2) the 'a complexes' (brown humic acids) which are lightly coloured and loosely bound to clay, and can be extracted by dilute NaOH even when clay is flocculated and KCl is present in the soda solution; (3) the 'b complexes' (grey humic acids), which are much darker and closely bound to clay, and can be extracted by dilute NaOH only when clay is completely dispersed

in the absence of KCl; their solubility in NaOH is only partial but seems to be increased by preliminary treatment with acetyl bromide.

The 3 groups are found in varying proportions in the different humus types: (1) characterize the mor types; being very much dispersed, they move in the soil and accumulate in the B horizon of humus-podzols; they seem to be the essential agents of podzolization; (2) are predominant in mull soils; they give to the brown forest soils or to the grey-brown podzolic soils, a somewhat unstable structure which favours the eluviation of clay under the action of external dispersing influences; (3) form about 50% of the humic matter in rendzina soils rich in lime; they are responsible for the very stable aggregated structure of such soils, which prevents the leaching of the colloidal elements. *From author's summary.*

2599. RUBILIN, E. V., and SUSLOVA, E. V. O sostave gumusa lesnykh počv predgor'ii severnogo sklona Central'nogo Kavkaza. [The composition of the humus of forest soils in the foothills of the northern slope of the Central Caucasus.] *Počvoved.* 1953 (7), (1-9). 15 refs. [Russ.] A.P.B.

Gives the results of analyses of podzolic soils belonging to the groups (1) brown and dark-brown forest soils, chiefly under Beech, and (2) grey and dark-grey forest soils, under Oak or Oak with Hornbeam, Beech, Elms and a well developed shrub layer of Hazel etc. The total amounts of humus in the 0-100 cm. and 0-20 cm. layers were similar in the two groups and similar also to those in the podzolic forest-steppe soils of the plains of Russia-in-Europe. In (2) the decrease of humus content with depth, throughout the profile, was more gradual than in (1), a difference ascribed to the development of (2) by podzolization of chernozems. The humus of (1) was concentrated exclusively in the silt fraction; in (2) ca. $\frac{1}{3}$ of the total humus was found in the coarser fractions. In the preponderance of fulvic over humic acids, of the ulmic-acid group among the humic acids, and the lower humic-acid/fulvic-acid ratio in the A_2 horizon, (1) resembled the podzolic soils of the European plains; whereas (2), with preponderance of humic acids, mainly as Ca humates, resembled steppe soils (chernozems). In view of its composition, the humus of (1) must possess a stronger podzolizing effect than that of (2). The N content of the humus in both of the Caucasian soils is higher than that of the forest-steppe soils of the European plains. N and fulvic-acid contents were found to increase with depth in the profile.

2600. PERSIDSKY, D. J., and WILDE, S. A. The effect of volatile substances released by soil, humus, and composts on the growth of excised roots. *Plant Physiol.* 29 (5), 1954 (484-6). 7 refs. O.R.E.

The effects were tested of volatile organic substances given off by soils or organic materials on the growth and longevity of excised roots. The following materials were tested: (1) hemorganic prairie mull humus, derived largely from the remains of roots of tall prairie grasses, (2) hemorganic crumb mull humus formed by the action of earthworms, (3) hologenic Douglas Fir mull

humus of amorphous or fine-grained structure developed by arthropods, (4) lignin hardwood/Hemlock bran-like mor developed by arthropods, (5) hardwood/coniferous matted mor consisting largely of fungus mycelia, (6) Hemlock saprogenous, partly lignified, matted mor, (7) fresh Hard Maple and Speckled Alder sawdust, (8) similar sawdust treated with anhydrous NH_3 and H_3PO_4 , and (9) similar chemically treated sawdust decomposed by the action of *Coprinus ephemerus*. Under the conditions of the study, volatile substances released by the surface layers of some forest soils excited a definite influence on the growth of excised roots. This influence was especially pronounced in roots exposed to arthropod mor and lignified mor. The effects observed in a closed desiccator may however not be applicable to natural conditions.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 2593, 2596-600, 2614, 2748-58, 2800, 2812, 2988.

2601. RODE, A. A. K voprosu o roli lesa v počvoobrazovanii. [The rôle of the forest in soil formation.] *Počvoved.* 1954 (5), (50-62). 21 refs. [Russ.] A.P.B.

A detailed refutation of the views of Remezov. [Cf. *For. Abstr.* 15 (No. 2202).]

2602. NYE, P. H. Some soil-forming processes in the humid tropics. II. The development of the upper slope member of the catena. III. Laboratory studies on the development of a typical catena over granitic gneiss. IV. The action of the soil fauna. *J. Soil Sci.* 6 (1), 1955 (51-83). 55 refs.

[For Part I see *For. Abstr.* 15 (No. 2209).] II is a detailed study of the development of a 28-ft. profile down to the biotite gneiss in 20-year-old secondary forest at Ibadan, Nigeria. III discusses with regard to position on the slope and/or in the profile (oxidation, oxidation-reduction, reduction zones) the composition of the worm- and termite-horizons; the thickness of the eluviated zone and the concentration of eluviated clay; clay minerals; pH and exchangeable-cation content; free Fe oxide of the clay fraction; origin, creep and dissolution of Fe concretions; and probable conditions under which the mottled subsoils of the upper and mid slopes are formed. IV Termites and ants have a profound influence, *Macrotermes nigeriensis* being the most important. Its mound is described and illustrated and the construction material analysed both mechanically and chemically, and compared with the surrounding soil for proof of origin. The rate of construction, decay, and density of these mounds indicate that $\frac{1}{2}$ ton of soil/acre/year is deposited on the surface in this activity. The earthworm, *Hippopora nigeriae*, whose activities are also described, is estimated to deposit 20 tons/acre/year on the surface under forest. The casts are richer in organic matter, exchangeable Ca and Mg, and have a higher pH, exchange capacity, and % saturation than the top 6 in. of soil.

2603. UCHIDA, T. [Studies on the humus layers of forest soils in Hokkaido. (1) Features of the

humus layers under conifers and the relationship of humus type to ground cover.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (1-6). [Jap.e.]

The depth of humus layer increases from mull to mor, every type being associated with a dominant ground cover. Bambuseae dominate the mull types, moss and Ericaceae, the mors. The conifer forests of Hokkaido are generally on mulls, the existence of which is probably due to the Bambuseae. *From author's summary.*

2604. GUERRA, A. TEIXEIRA. Formação de lateritos sob a floresta equatorial amazônica (Território Federal do Guaporé). [The formation of laterite soils under the equatorial forests of Amazonia (Federal Territory of Guaporé).] *Revista brasileira de Geografia*, Rio de Janeiro 14 (4), 1952 (407-26). [Port.f.span.e.g.esper.] L.S.

The existence of laterite soils under a dense forest cover confirms observations made in Africa and elsewhere in S. America that they are found either (1) under savanna, or (2) under forest. The only difference in the process of formation is that in the case of (1), hydroxides of Fe and Al concentrate at the surface, whereas with (2) the concentration takes place at some depth from the surface. Observations made in the Guaporé Territory are presented. Thick and compact laterite soil layers were found near Pôrto Velho, where the devastation of the forests began in 1907. Compact laterite layers were also found under dense forest. It is concluded that laterization is a natural process which human influence accelerates, but does not originate.

114.4. Soil Classification. Soil Types

See Nos. 2587, 2594, 2598-9, 2602, 2604, 2607, 2696, 2748, 2752-5, 2795-7, 2800-2.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 2600, 2646, 2747, 2802-4, 2988, 3263.

2605. OVINGTON, J. D. Studies of the development of woodland conditions under different trees. III. The ground flora. *J. Ecol.* 43 (1), 1955 (1-21). 30 refs.

In three diverse localities the ground floras in a series of 20-year-old forest plots, planted with different tree species [*Larix leptolepis*, *Alnus incana*, *Betula alba* s.l., *Pinus nigra* and *Pseudotsuga taxifolia*] were examined. Marked differences occur in the plant communities formed under the various tree stands and in adjoining unplanted areas. Plant lists and frequencies are given for the ground floras, and the complex relationships of the vegetation to the woodland environment as a whole are discussed. Several stages in the development of the plantations are recognized, and estimations of the weights of water, dry matter, ash, C, and N in the various ground vegetations made. It is suggested that the ground flora gives some indication of site conditions, and its study is therefore of value in considering methods of reforestation. [Cf. *For. Abstr.* 15 (No. 2212).] *From author's summary.*

2606. PETROV, A. P. Otnošenje rastenii travjanogo pokrova dubrav k nekotorym faktoram plodorodija počvy. [Relation of plants of the herb layer in mixed Oak woods to certain soil fertility factors.] *Dokl. Akad. Nauk SSSR* 97 (2), 1954 (333-5). 3 refs. [Russ.] A.P.B.

During studies of forest types in the Tartar Republic (and, less extensively, in the Chuvash Republic) counts were made of the herbaceous flora and soil samples taken from the humus horizon (usually 3-10, in some cases 6-14 cm.; i.e. the main rooting zone of the herbs) in numerous 1-m. quadrats under closed forest stands, mostly of deciduous species with Oak dominant. Results are tabulated by species, showing for each the number of individuals or individual shoots per sq. m. against (a) total adsorbed bases in m.e./100 g. soil and (b) pH. Some species showed a regular increase in abundance with increase of (a) and (b): these were *Aegopodium podagraria*, *Asperula odorata*, *Pulmonaria obscura*, *Stellaria holostea*, *Polygonatum multiflorum* and *Paris quadrifolia*. *Urtica dioica* and *Aconitum excelsum* may also belong to this group. Some, e.g. *Equisetum pratense*, *Convallaria majalis*, *Viola mirabilis*, showed maximum abundance with (a) < 20 m.e., (b) < 6.0: *Carex pilosa*, though variable, appeared to fall into this group, its optimum pH being 5.5-6.0. *Glechoma hederacea* and *Mercurialis perennis* were most abundant with (a) 20-30 m.e. and (b) respectively 6.0-6.5 and 5.5-6.0; *Dryopteris filix-mas* and *Struthiopteris filicastrum* with (a) 10-20 m.e. and (b) respectively 6.0-6.5 and 5.5-6.0. *Asarum europaeum* and *Geum urbanum* showed no clear trends.

2607. WILDE, S. A., and LEAF, A. L. The relationship between the degree of soil podzolization and the composition of ground cover vegetation. *Ecology* 36 (1), 1955 (19-22). 5 refs.

The study area was in Adams County, Wisconsin, at the junction of the glacial outwash and a ridge of sand dunes, and included an erratic sphagnum peat bog bearing a stand of Black Spruce. The surrounding forest of 40-year-old Jack Pine and Scrub Oak is on a complete gley podzol-melanized sand catena. Detailed study of ground vegetation and soil characters indicated that there was very little overlapping of edaphic and floristic boundaries. Several ground flora species were rigorously confined to one or more adjacent members of the soil catena.

2608. BEESON, K. C., LAZAR, V. A., and BOYCE, S. G. Some plant accumulators of the micro-nutrient elements. *Ecology* 36 (1), 1955 (155-6). 5 refs.

As part of a comprehensive study of trace elements in Atlantic Coastal Plain soils and forage crops, four commonly browsed plants and a grass were sampled at 3 periods in each of two years. An unexpected result of the study was the extremely high concentration of Co found in the leaves of *Nyssa sylvatica*; the highest concentration was 58.9 p.p.m., and no sample of leaves of this species contained < 0.7 p.p.m., whereas the range of Co concentrates in leaves of other species was 0.01-0.25. Similar results were obtained from samples in New

York, N. Carolina, and E. Georgia. Clear evidence was also obtained that *Ilex glabra* accumulates large quantities of Zn (18.2-83.0 p.p.m. compared with 7.3-26.2 for other species). The widespread occurrence of these two species on uncultivated sites should contribute to their value as indicators of the Co and Zn status, respectively, of Coastal Plain soils.

2609. WILLCOX, O. W. Meaning of the great German soil fertility survey. *Soil Sci.* 79 (2), 1955 (123-32). 8 refs.

Makes use of a table summarizing the yield, in > 27,000 field tests with N, P, and K, of the 10 chief crops of the survey, for a large-scale verification of Mitscherlich's yield (y) equation: $\log(A - y) = \log A - cx$ as applicable to many kinds of plants under all conditions of soil and cultural practices. A = max. yield, x = growth factor (here plant nutrient).

114.6. Soil Biology

See also Nos. 2597, 2602, 2800.

2610. DOMMERGUES, Y. Aperçu sur l'application des méthodes biologiques à l'étude des sols africains. [The application of biological methods to the study of African soils.] *Bois For. Trop.* No. 38, 1954 (13-21). [F.e.span.]

Briefly describes the biological methods applied to soils and discusses the interpretation of bacteriological analyses of Madagascar soils. Preliminary results indicate that these may be placed in one or other of two large biological groups: (1) fragile soils of unstable biological equilibrium such as old developed alluviums and podzols; (2) soils in stable biological equilibrium with important mineral reserves, such as colluvial or recent micaceous alluvial soils. Group (1) are very sensitive to different degradation factors, e.g. over-felling or clearing, and are much affected by the botanical character of forest stands. Group (2) can endure relatively severe treatment without suffering injury, deforestation or afforestation have little effect on their biological activity, and the botanical composition of forest stands is almost without influence on them.

2611. MEIKLEJOHN, J. The effect of bush burning on the microflora of a Kenya upland soil. *J. Soil Sci.* 6 (1), 1955 (111-8). 13 refs.

Surface soil samples taken from former Wattle and grassland sites before and at intervals after burning, showed a reduction in numbers (by direct and by plate counts) of fungi, actinomycetes and bacteria. Fungi disappeared completely for a short time on 2 of the 3 sites. Aerobic N-fixers are apparently killed but anaerobic N-fixers, though not very efficient at any time, appear to survive. Nitrifying bacteria are killed or very much reduced. As these produce easily leached nitrates this reduction may explain the greater total N of the burned plots.

2612. DASTE, P. Action simultanée de la colophane et de l'amidon sur le développement de l'*Azotobacter* dans le sol. [The simultaneous action of resin and starch on the development of *Azotobacter* in the soil.] *C.R. Soc. Biol., Paris* 148 (5/6), 1954 (515-8). [F.] O.R.S.

Resin and starch added to soils stimulated the growth of *Azotobacter*, much more intensely than starch alone. This fact should be borne in mind in studies of the rhizosphere effect of *Pinus pinaster* on *Azotobacter*.

2613. KRZEMIENIEWSKA, H., and BADURA, L. Przyczek nad znajomości mikroorganizmów ściółki i gleby lasu bukowego. [Micro-organisms in the litter and soil of a Beech forest.] *Acta Soc. Bot. Polon.* 23 (4), 1954 (727-81 + 4 plates). 37 refs. [Pol.e.] O.B.D.

Presents the results of a study of micro-organisms isolated from the litter and soil of the Beech forest of Muszkowice.

2614. KRZEMIENIEWSKA, H., and BADURA, L. Z badań nad mikoflorą lasu bukowego. [The mycoflora of Beech woods.] *Acta Soc. Bot. Polon.* 23 (3), 1954 (545-87). 39 refs. [Pol.e.] O.B.D.

Presents the results of investigations into the fungus flora of the litter and soil—the species, their distribution and variations in different seasons; a study of the humic acids in litter and leaves; and experiments with cultures.

2615. BERNÁT, J. Mykoflora lesných pôd. [The mycoflora of forest soils [near Banská Štiavnica, Slovakia].] *Preslia* 26 (3), 1954 (277-84). 9 refs. [Slovak.russ.] E.M.B.

Gives the results of studies on samples from 3 different depths (2-5, 5-10, 10-20 cm.) in 5 sandy loams of uniform texture, differing in degree of podzolization and tree cover, viz. [figures in brackets = pH at 2-5 cm.]: (a) Spruce, no ground flora (4-0); (b) Spruce/Fir, ditto (5-6); (c) ditto, with moss cover (6-0); (d) Silver Fir/Beech, with herbs (5-7); (e) Beech/Hornbeam, with herbs (5-9). Cultures from soil suspensions gave the following fungus populations (in thousands per g. of soil) for the 3 layers respectively: (a) 300, 350, 65; (b) 420, 380, 115; (c) 230, 90, 42; (d) 570, 340, 110; (e) 720, 420, 180. The % representation of the chief genera (*Penicillium*, *Aspergillus*, *Mucor*, *Trichoderma*, *Verticillium*, *Zygorhynchus*, *Chaetomium*, *Stysanus*, *Stachybotrys* and *Cladosporium*) and the presence or absence of species of these and other genera, are tabulated for the 3 soil layers, and differences in the specific composition of the mycoflora under the different stands are summarized. All fungi isolated, and all the soils themselves, were tested for capacity to decompose cellulose. Fungi readily decomposing cellulose and those showing no such capacity are listed. The capacity of the soils for cellulose decomposition increased steadily from (a) to (e).

2616. BELLINGER, P. F. Studies of soil fauna with special reference to the Collembola. *Bull. Conn. agric. Exp. Sta.* No. 583, 1954. pp. 67. 42 refs.

A study was made of the soil fauna in the following habitats: (1) a pure stand of *Pinus resinosa*, (2) a pure stand of *P. strobus*, (3) a stand of young *P. strobus*, in an old field area, (4) an unplanted old field area, and (5) a mixed stand of mature *P. strobus* and *Tsuga canadensis*, all in Connecticut. The most varied soil fauna was found in (3), with nearly 60 species of Collembola in comparison with 30-40 in other areas; (1)-(4) do not differ much between themselves in

number of species, but (1) and (2) support larger populations than (3) and (4). Differences in depth of penetration and seasonal fluctuation in numbers of Collembola were studied. The need for much more study of soil fauna is stressed.

114.7. Soil Surveys and Surveying

See also No. 2587.

2617. JÁRÓ, Z. A valkói termőhelyfeltárás eredményei. [Results of the site survey at Valkó.] *Erdő* 3 (1/2), 1954 (40-9 + 3 folding maps). [Hu.]

The varied climatic conditions, wide range of soils, and human interference with natural succession, in the selected area, offered an excellent basis for investigations into methods of site surveying. In contrast to areas with a less disturbed equilibrium of plant associations, the survey was based on mapping (1 : 10,000 scale) the soils according to type, texture, and lime content; determinations were made on samples from profiles for every 3-5 ha. Maps showing tree species, ratio of mixtures, and site class were prepared on the present and future composition of stands, the plan for restocking having been framed with a view to suitable mixtures under given conditions of soil, climate and exposure.

116. Hydrology. Soil and Water Conservation and Erosion

See also Nos. 2587, 2592, 2758, 2797, 2975, 2980, 2984, 3018-9, 3092, 3680.

2618. KATSUMI, S. [Snow layer in the forest.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (156-61). 4 refs. [Jap.e.]

In the two forests studied (1949-53 inclusive) snow depth increased linearly with altitude and its density with depth. Snow depth, greatest in forest openings, decreased through broadleaved to coniferous forest. It melts away in the same order.

2619. BERNARD, E. A. L'évapo-transpiration annuelle de la forêt équatoriale congolaise et l'influence de celle-ci sur la pluviosité. [Annual evapotranspiration from the equatorial forest of the Congo, and its influence upon rainfall.] *Bulletin des Séances de l'Institut Royal Colonial Belge, Bruxelles* 24 (3), 1953 (1027-32). 5 refs. [F.] L.S.

Discusses methods of estimating evapotranspiration from large areas, briefly reviews some experiments carried out by the Institut National pour l'Étude Agronomique du Congo Belge, and gives the opinion that available data support the theory that equatorial forest is the result and not the cause of high precipitation, and that clearance of the forest and the substitution of secondary forest, pastures and various agricultural crops would increase and not decrease the rainfall, since (a) a slight temperature rise over the managed areas might lead to convergence of humid air masses of oceanic origin, and (b) the more varied nature of the modified plant cover should favour convective movements.

2620. SMIRNOV, V. V., and ODINOKOVA, N. S. Gidrologičeskaja rolj osinovyh lesov. [The hydrological rôle of Aspen woods.] *Dokl. Akad. Nauk SSSR* 99 (5), 1954 (849-52). 10 refs. [Russ.] A.P.B.

Gives details of stand composition and constitution, along with data on leaf-weight/ha., for 4 plots (8, 25, 37 and 63 years old) in dense mixed Aspen woods (upper storey almost pure Aspen; lower storeys of mixed deciduous species; *Aegopodium podagraria*/*Carex pilosa* type; of vegetative origin following the clear felling of Oak forest) on dark-grey, heavy clay-loam forest soil (physical properties tabulated) in the Tellerman Forest, Voronezh. Records of precipitation under canopy, soil moisture to 2 m. depth, and evaporimeter measurements as an index to evaporation plus transpiration of the herbaceous layer [no details given] on these plots, and data for run-off and infiltration in similar soil and geomorphological conditions in mixed Oak woods, are used to compile a tabular estimate of the water balance on the plots for a whole growing season (April-Nov.), based on the hydrological formula. This gives transpiration of the woody vegetation as 203, 230, 201, and 185 mm. for the respective 4 ages. Leaf-weight/ha. varies in the same way (3, 4, [no data], and 2.9 metric tons/ha.), and a straight-line relationship is found to exist between transpiration and the volume c.a.i. of the tree stand.

2621. BURGERS, T. F. La influencia sobre el clima de las repoblaciones forestales. [The influence of afforestation upon climate.] *Montes, Madrid* 10 (60), 1954 (399-408). [Span.]

Records of rainfall from 1887 to 1953 are presented for 12 sites in the Minas de Río Tinto district (Huelva province), where about 3600 ha. were afforested by the Riotinto Company in 1917 and 1918 with *Pinus pinea* and *P. pinaster*. In general, annual rainfall in the afforested areas has increased by 6-12% (in dry years by 16%), the effects appearing ca. 15 years after afforestation. Rainfall for the whole region (including non-forested areas) has increased by ca. 6-8%. No marked changes in average annual temperatures have been found.

2622. DUNFORD, E. G. Surface runoff and erosion from Pine grasslands of the Colorado Front Range. *J. For.* 52 (12), 1954 (923-7). 1 ref.

Treatments of heavy, moderate and no grazing and of litter and litter + tree-cover removal in the Ponderosa Pine/bunch grass ecotone show that grazing must be moderate (4 acres/cow/month), timber cut lightly (single-tree selection) and fire totally eliminated.

2623. SHERRY, S. P. The effect of different methods of brushwood disposal upon site conditions in Wattle plantations. II. A study of run-off and erosion during the first two years after clear-felling and regeneration. *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (27-36). 4 refs.

Methods of brushwood disposal [cf. *For. Abstr.* 15 (No. 1065)] had a significant effect on run-off and erosion, these being correlated with intensity rather than amount of rainfall. Slope increased this effect though not significantly. In summer-rainfall areas great protection against soil and litter loss is given by piling brushwood on the contour in windrows

6 ft. high, 12 ft. wide, and 28 yards apart. Burning alternate piles is risky and burning all brushwood on steep slopes leads to serious loss. The greatest danger is likeliest in the first summer after clear felling; this probably gradually decreases as the trees mature, until they are again felled. Thus with short (7-year) rotations and all brushwood burned, there is a rapid deterioration of the site; a slower, less obvious deterioration may be expected on gentler slopes with longer rotations. *From author's summary and conclusions.*

2624. BURGER, H. Einfluss des Waldes auf den Stand der Gewässer. V. Mitteilung. Der Wasserhaushalt im Sperbel- und Rappengraben von 1942/43 bis 1951/52. [The influence of forest on the water régime. Part V. The water régime in the Sperbel- und Rappengraben from 1942/43 to 1951/52.] *Mitt. schweiz. Anst. forstl. Versuchsw.* 31 (1), 1954 (9-58). 56 refs. [G.g.f.]

[For earlier reports on this study, see *For. Abstr.* 6 (p. 122), 8 (No. 71).] The present figures on the whole confirm the earlier findings as to the greater water consumption of forests and their effects in preventing floods, keeping up stream flow in droughts, and preventing soil erosion.

2625. MAŘAN, B., and LHOTA, O. Vliv lesních porostů na povrchový odtok vod. [Effect of forest stands on surface run-off.] *Les, Bratislava* 1 (11), 1954 (4-11). [Cz.]

2626. TAKEDA, S., et al. [A study of the flood (1953) in Kinki. Part 1. (1): The relation between increased flow due to the storm and precipitation in the upstream of the Arita. (2): Landslides. (3): Forest influences upon landslides. Part 2. Landslides and their control.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 74, 1954 (1-108 + 6 photos + 2 maps). 23 refs. [Jap.e.]

Articles (by S. Takeda, T. Endo, M. Morisawa, R. Watanabe, K. Takiguchi, R. Hara, T. Shidei, T. Kashiya, T. Kawaguchi, and S. Namba) describing a co-operative study of storm damage illustrated by colour photographs, a synoptic chart, detailed topographic maps and geological sketches, with information on peak flows, classifications of landslides (diagram), the protective effects of different kinds of cover, e.g. natural forest versus plantations, and recommendations on control. Where one stream was blocked, the temporarily held plus stored water penetrated and flowed below the root zone, producing conditions beyond the stabilizing power of forest growth. Other damage was related to faulting and the sliding over each other of bodies of soil or rock of different consistency.

2627. HUMBERT, H. Un exemple suggestif de désertification provoquée: les territoires du Sud de Madagascar. [A thought-provoking example of a man-made desert: The regions of southern Madagascar.] [Proceedings] *Technical Meeting, International Union for the Protection of Nature, Caracas* 1952 1954 (449-62). [F.]

A review of the vegetation, climate and soils and the causes of degradation of the vegetation.

14. SYSTEMATIC ZOOLOGY

See also No. 2697.

145.7. Insecta. Entomology

See also Nos. 3165 *et seq.*, 3535-6.

2628. DAVIS, E. W., LANDIS, B. J., and GIBSON, K. E. Aphid collections in the Yakima Valley of Washington. *J. econ. Ent.* 47 (6), 1954 (1117-21). 7 refs.

Lists 139 species of aphids with their host plants (many woody spp.) and earliest and latest collection dates. Trap pans, set on a tower, at 0.5, 10, 15 and 20 ft. above ground caught (2 years' average with narrow range of difference) respectively 66, 15, 9, 6, and 4% of the total.

2629. KAPUR, A. P. On some unrecorded host plants of the lac insect, *Laccifer lacca* (Kerr). (Homoptera: Lacciferidae). *Journal of the Bombay Natural History Society, Bombay* 52 (2/3), 1954 (645-7). 3 refs. O.R.S.

Lac insects were found on solitary trees of *Acacia auriculiformis* at Ranchi, and *Jacaranda mimosifolia* at Jamshedpur, and on nearly a score of trees of *Peltophorum ferrugineum* at Jamshedpur.

2630. STEHR, G. A laboratory method for rearing the Spruce budworm, *Choristoneura fumiferana* (Clem.). (Lepidoptera: Tortricidae). *Repr. from Canad. Ent.* 86 (9), 1954 (423-8). 4 refs.

Describes a laboratory method that makes it possible to rear several generations in one year, avoids direct handling during development, and allows easy access to the insects at all stages for observation. Over-wintering mortality of second-instar larvae remains the major problem in rearing stocks. *From author's summary.*

2631. KOSUGI, K. [On the hatching of the gypsy moth *Lymantria dispar*? which hibernated as egg (Preliminary).] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (101-5). [Jap.e.]

Embryo development takes place normally before winter; the embryo then lies dormant within the egg ready to respond to the [first suitable] temperature and hatch out in Jan. or Feb. From 0-97% may hatch out, according to environmental conditions. These will be further reported upon.

2632. KARPIŃSKI, J. J., and MAKÓLSKI, J. Biegaczowate (Carabidae, Coleoptera) w biocenozie lasu Białowieckiego Parku Narodowego. [Carabidae (Coleoptera) in the forest biocoenosis of the Polish National Park of Białowieża.] *Roczn. Nauk leśn.* No. 5, 1954 (105-36). 30 refs. [Pol.pol.russ.e.]

A field study (1946-51) tentatively grouping the species identified (74 out of 134 recorded) into biotopes, with typical, secondary, and occasional members and data on their relative seasonal activity. The implications of the complex of biotopes for control of pests, and the influence of forest management on such control, are discussed.

2633. BENSON, R. B. The finding of many larvae of the sawfly *Xyela julii* Brébisson (Hym. Xyelidae). *Ent. mon. Mag.* 90 (1079), 1954 (93).

Notes on the biology of this pollen-eating species. Once considered rare in Britain it is generally present wherever Scots Pine occurs.

2634. HUSSEY, N. W., and KLINGLER, J. Variation in *Megastigmus pinus* Parfitt (Hym., Chalcidoidea, Torymidae). *Ent. mon. Mag.* 90 (1084), 1954 (198-201). 8 refs.

A study of this very varied species from material of 6 provenances of *Abies procera* shows that range of size varies with thorax colour pattern, lighter specimens generally being larger, with more bristles on the proximal $\frac{1}{2}$ of the sub-marginal vein. The proportion of different colour patterns may vary with provenance, and populations from the same host tree may have different patterns in different years.

2635. OTTO, D. Praktische Massnahmen zum Schutze und zur Förderung der roten Waldameise. [Practical measures for protecting and increasing the numbers of *Formica rufa*.] *Merckbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutz tier. Schäd.)* No. 16, 1954. pp. 10 + 3 photos. 8 refs. [G.]

2636. STEYSKAL, G. C. Further notes on Diptera of tree trunks—with descriptions of two new species of *Drapetis* (Diptera: Empididae) and an abstract of a Finnish paper on Diptera of Tuomikoski. *Pap. Mich. Acad. Sci.* 38, 1952 (1953), (255-60). 4 refs. L.S.

Observations on *Populus deltoides* and *Acer* spp., and a list, with brief notes, of species mentioned in the Finnish paper.

15. ANIMAL ECOLOGY. GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING

See also Nos. 3153 *et seq.*, 3672-4.

2637. ENGSTRÖM, K. Fågelfaunans beroende av skogens sammansättning. [The dependence of the bird fauna on the composition of the forest.] *Medd. SkogsforsknInst., Stockholm*. 45 (2), 1955. pp. 47. 33 refs. [Sw.e.] Price Kr.2.

Presents results of a census on 5-02 sq. km. at Bogesund near Stockholm, of which 3-67 sq. km. consists of forest with Pine and Spruce dominant, and of deciduous trees (Birch, Alder and Oak) scattered or in small woods. Data are given on the relative frequency of the different bird species and the relation between number of pairs/sq. km. and tree species, site quality, and stand age and density. The bird fauna of deciduous and coniferous woodlands, and of this area and of districts in N. Sweden (as shown by 2 earlier censuses) are compared.

2638. TURČEK, F. J. A contribution to the function of forest bird population from the point of view of biocoenology and forest management. *Aquila, Budapest* 55/58, 1948/51 (1954), (51-73). 53 refs. [E.hue.e.russ.] N.C.L.

Studies made in the deciduous and mixed forests of southern and central Slovakia on bird populations, their food habits and influence on seed distribution and on insect, mammal and game populations.

2639. KARPIŃSKI, J. J. Ptactwo w biocenozie Białowieckiego Parku Narodowego (badania). [Avifauna in the biocoenosis of the Polish National Park of Białowieża (investigations).] *Roczn. Nauk leśn.* No. 5, 1954 (3-104). 12 refs. [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 120.)

A detailed study, based on relative-frequency indexes and presenting 'spectra' of various categories of birds in the Park in relation to type of food, method of food procurement, and nesting habits, for 9 forest or plant associations. The inter-relationships between forests and forest birds are stressed, with particular reference to the rôle of Paridae in Pine stands. Certain bird species are selected as indicators for identifying bird groups in managed forests.

2640. MIKULA, A. Život naší zvěře. [The life of Czechoslovakian wild mammals and birds.] Lesn. knihovna (malá řada) No. 37 (2nd ed.), 1954. pp. 218. 27 refs. [Cz.] Price Kčs.13.30.

Illustrated description of ca. 140 wild mammals and birds.

2641. GÖHRE, K. Bestimmung des Kräfteinsatzes und der Arbeitsleistung des Bibers (*Castor fiber* L.) beim Holzfällen. [Power input and work done by the beaver in tree felling.] Arch. Forstw. 3 (1/2), 1954 (82-9). [G.]

Beavers are preserved at Rossau on the Elbe and the article details the method by which an animal 12-20 kg. in weight can fell in one or two nights a tree 25 cm. in diam. (Poplar, Aspen, Willow, Alder, Maple, Elm, or Oak). With the use of apparatus replicating the mechanical system of this animal's incisors and jaws, it was calculated that, in working through 1 kg. of wood, 1000 bites remove 142 chips, the work requiring 68-81 kg. of energy for each bite. The work performed is 1500 m.-kg. per kg. of gnawed wood.

2642. AUGUSTINY, G. Unsere Fledermäuse, ihre Lebensweise, Bedeutung und ihr Schutz. [Our bats, their habits, importance and protection.] Merkbk. Inst. Forstwiss. Eberswalde (Abt. Forstschutz tier. Schäd.) No. 12, 1954. pp. 16. [G.]

2643. MOTT, S. Les a lovná zvěř. [Forest and game.] Lesn. práce 33 (10), 1954 (467-70). [Cz.]

Estimates the food available for deer, viz. buds and shoots, at two forest centres (Bohemia and Slovakia), lists the species whose leaves were found in the rumens of 2 deer shot in these forests, and, assuming that 8% is a safe figure for browsing damage, calculates the maximum sustainable number of deer/ha.

2644. The wildlife of Newfoundland: a report by the Wildlife Management Institute, Washington, D.C. Minister of Mines and Resources, St. John's, Newfoundland. 1955. pp. 39.

2645. BOOTH, A. H. The Dahomey Gap and the mammalian fauna of the West African forests. Rev. Zool. Bot. afr. 50 (3/4), 1954 (305-14). 6 refs. [E.]

Explains the present distribution of subgenera of mammals on either side of the gap, partly by its former greater extent and partly by the evolutionary phase of the animals at the time of the gap's first appearance. Judging by the poverty of the W. Nigerian fauna, at least the area between the Volta and Niger was then denuded of forest, but it is unnecessary to postulate a continuous gap to the Sanaga River (N. boundary of the Gaboon region).

16. GENERAL BOTANY

160. Plant Chemistry

See also Nos. 2605, 2608, 2749, 2753-6, 3040, 3592 et seq.

2646. PURI, G. S. The foliar ash content in some *Shorea robusta* trees of different quality classes and its relation with soil calcium in some forests of India. Indian For. 81 (2), 1955 (98-102). 13 refs.

Analysis of foliar ash of Sal [*Shorea robusta*] of quality classes I-IV from various parts of India, showed that mineral content increases from I to III and decreases in IV, the differences being significant. A good negative correlation was found between the foliar ash and soil Ca. These results tend to show that Sal is a non-exacting species, showing best development on non-calcareous soils. The possibility of using analysis of foliar ash to replace soil analysis is discussed.

2647. KORČEMKIN, F. I., ŽEREBOV, L. P., and EVSTIGNEEV, V. B. Metilirovannye večestva nearomaticeskoi prirody kambial'nogo soka sosny. [Methylated substances of non-aromatic nature in the cambial sap of *Pinus sylvestris*.] Ž. prikl. Him. 27 (11), 1954 (1217-21). 7 refs. [Russ.russ.] P.O.

Most of the OCH_3 contained in the cambial sap of *P. sylvestris*, collected at different times of the growth period over several years, boiled after collection, and decanted from the precipitate formed, belongs to non-aromatic compounds. [Cf. For. Abstr. 15 (No. 2249).]

2648. GUSEVA, A. R., and BORIHINA, M. G. Nakoplenie gutty i smoly v listyakh evkommii v tečenie vegetacii. [Accumulation of gutta percha and resin in the leaves of *Eucommia ulmoides* in the course of the growing season.] Dokl. Akad. Nauk SSSR 93 (5), 1953 (871-3). 7 refs. [Russ.] A.P.B.

Tabulates data from analyses of leaves gathered at intervals from 28 June to 14 Nov., 1952, from 4- to 14-year trees grown in Abkhazia, using both bulk samples of 200 leaves (1 leaf per tree) and single-tree samples (100 leaves per tree). The gutta-percha contents rose gradually until the end of August, then increased suddenly in September and showed no important change up to the end of the season. Resin contents increased up to August and then remained steady until November, when a sharp decrease occurred. Less complete data are also tabulated for leaf contents of ash, Si, Ca, K, P, total N and aucubin at the same dates: of these the first 3 increased steadily, P and K remained more or less constant, and total N decreased in the course of the season; for aucubin no analysis was made before 30 Oct., but between that date and 14 Nov. its content showed a marked fall.

2649. GUSEVA, A. R., and BORIHINA, M. G. O metode opredeleniya hlorogenovoi kisloty i dinamike nakopleniya ee i gutty v listyakh evkommii. [Method of determination of chlorogenic acid, and the dynamics of the accumulation of chlorogenic acid and gutta-percha in leaves of *Eucommia ulmoides*.] Biohimija 20 (1), 1955 (106-8). 5 refs. [Russ.] E.M.B.

[Cf. *For. Abstr.* 16 (No. 75).] A further method for the quantitative determination of chlorogenic acid is described and a tabular comparison is made of the contents of this acid, gutta percha, and resin in leaves on 6 dates from late June to mid-November.

2650. POLLARD, J. K., JR., and SPROSTON, T. Nitrogenous constituents of sap exuded from the sapwood of *Acer saccharum*. *Plant Physiol.* 29 (4), 1954 (360-4). 15 refs. O.R.E.

Lyophilized sap from the sapwood of *A. saccharum* contains N in the following known forms: (1) NH_3 ; (2) peptides, one of which is liberated from its Hg precipitate by H_2S treatment, and on hydrolysis yields at least 7 amino acids; and another, or others, that are not liberated by H_2S treatment and yield on hydrolysis at least cysteine, proline and hydroxyproline; (3) an alcohol-insoluble fraction accounting for 17% of the total N; this fraction is protein-like in its alcohol solubility but does not yield on hydrolysis all of the amino acids that one would expect to find in a normal plant protein; and (4) a compound or compounds that yield NH_3 on the gentle acid hydrolysis usually used for amide determination. When Maple sap is concentrated to syrup by boiling, a scum rises to the surface. Since this scum contains the same array of amino acids found in the alcohol-insoluble portion of whole sap, and since boiled sap contains no alcohol-insoluble N, it is probable that this scum represents the alcohol-insoluble N present in sap before boiling. During the boiling process, the alcohol-soluble peptide is partially broken down to free amino acids and to lower peptides. There is at present no clue to the ultimate origin of these nitrogenous compounds or to their relation, if any, to the problem of sap flow. *From authors' summary.*

2651. MCKEE, H. S., and URBACH, G. Iminoacids in *Santalum* leaves. *Nature, Lond.* 175 (4454), 1955 (470). 6 refs.

Extracts of leaves of two Australian species were examined by paper chromatography. With *S. obtusifolium* the most prominent reactions with ninhydrin and isatin were given by proline, hydroxyproline and glutamine. With *S. murrayanum*, proline gave by far the most prominent spot, but hydroxyproline was also present. [Cf. *For. Abstr.* 14 (No. 982).]

2652. KRAHL-URBAN, J., KANITZ, H. R., and PUNIN, W. Über den Nachweis von Agglutininen an Früchten und Blättern der Stiel- und Traubeneiche (*Quercus pedunculata* Ehrh. und *Q. sessiliflora* Salisb.). [The presence of agglutinins in fruit and leaves of *Q. pedunculata* and *Q. sessiliflora*.] *Z. Forstgenet.* 4 (1), 1955 (18-20). 16 refs. [G.g.e.f.]

Chemical analysis of acorns and leaves revealed variations in content of agglutinins, which belong neither to the tannin group nor to the globulins.

2653. SOSA-BOURDOUIL, C., and SOSA, A. Recherches sur la composition du pollen de *Corylus avellana* L. [Research on the composition of pollen of *C. avellana*.] *Bulletin de la Société de Chimie biologique*, Paris 36 (2/3), 1954 (393-404). 56 refs. [F.f.] O.R.S.

A review of literature with a survey of original research by the authors. [Cf. *For. Abstr.* 14 (No. 977).]

161. Physiology

See also Nos. 2600, 2620, 2701, 2736, 2740, 2752, 2760-4, 2782, 3037, 3172, 3524-7.

2654. CORNWELL, P. B. Techniques for labelling trees with radioactive phosphorus. *Nature, Lond.* 175 (4445), 1955 (85-7). 9 refs. [West African Cacao Research Institute, Tafo, Gold Coast.]

To investigate the movement of the mealybug vectors of swollen-shoot disease of Cacao, techniques were studied for obtaining radioactive trees for the subsequent labelling of insects at their feeding sites under field conditions. The artificial release of labelled insects in the field is unsatisfactory for such investigations. Three techniques are described: introduction of P^{32} , held in a 'Plasticine cup', to a surface exposed by removal of bark; introduction of P^{32} through a glass tube sealed with 'Picine wax' into a small hole at the base of the plant; introduction of P^{32} by trunk implantation [cf. *For. Abstr.* 16 (No. 79)]. All three are suitable for obtaining radioactive host plants, but they suffer from two disadvantages, viz. that translocation of P^{32} from the point of application is small and the distribution of tracer within the tree is localized. Similar results were obtained with Ca^{45} and Rb^{86} injected into Yellow Birch [cf. *For. Abstr.* 14 (No. 3033)]. Future investigations will be directed towards methods of root application and the use of carriers to aid in tracer distribution.

2655. TURECKAJA, R. H. O postuplenii i raspredelenii stimulatorov rosta v čerenkah s primenением radioaktivnogo joda. [The uptake and distribution of growth regulators in cuttings, using radioactive iodine [as tracer].] *Izv. Akad. Nauk SSSR (Ser. biol.)* 1954 (4), (35-41). 3 refs. [Russ.]. A.P.B.

Experiments were made on the uptake of *p*-iodophenoxyacetic acid labelled with I^{131} by cuttings of both herbaceous and woody plants, including *Populus* sp. and *Salix* sp. For these last it was found that I^{131} was taken up chiefly by the basal portions of the cuttings, especially the portion immersed in the treating solution, i.e. the region of root formation. The upper portions showed only small amounts of I^{131} , though on green cuttings the leaves of the *Populus* and the lower leaves of the *Salix* contained considerable amounts. Maximum I^{131} contents always occurred in the xylem, followed by the phloem, with minima in the buds. The experiments indicate that the uptake of growth regulators might be controlled by varying the depth of immersion in the treating solution.

2656. BOLE, P. V., and BHARUCHA, F. R. Osmotic relations of the leaves of *Avicennia alba* Bl. *Journal of the University of Bombay, Bombay (n.s.)* 22 (5B), 1954 (50-4). 12 refs. L.S.

Describes experiments to find the effects, if any, of factors such as the relative age of the leaf, water content, total N and C content and rate of evaporation on osmosis in detached leaves of *A. alba*. It was discovered that the higher rate of transpiration

brings about a higher accumulation of osmotically active substances in the older leaves; the osmotic pressure does not, however, vary directly with the water content. Total C and N content are greater in older leaves, but there is no direct correlation with osmotic pressure.

2657. GREENIDGE, K. N. H. **Studies in the physiology of forest trees. I. Physical factors affecting the movement of moisture.** Repr. from *Amer. J. Bot.* 41 (10), 1954 (807-11). 43 refs. (*Contr. Div. For. Biol. Dep. Agric. Can. No. 144*.)

Studies of the moisture economy of healthy and diseased *Betula lutea* have indicated the possible ready fracture of stretched water columns in transpiring trees under conditions of reduced absorption [cf. *For. Abstr.* 15 (No. 1624)]. This paper (the first part of an investigation of the validity of this hypothesis) reviews the concept of ready fracture in the light of several physical, structural and technological factors and offers theoretical support based on kinetic considerations and nucleation phenomena.

2658. ANDERSSON, N. E., HERTZ, C. H., and RUFELT, H. **A new fast recording hygrometer for plant transpiration measurements.** *Physiol. Plant., Copenhagen* 7 (4), 1954 (753-67). 26 refs. [E.e.]

A new automatic-recording hygrometer has been constructed for transpiration measurements, using a so-called streamer corona discharge from a pointed wire against a plane in the air. Its construction, properties and application are described. The method of using excised plants or plant organs in measurements of transpiration is discussed, in the light of first results with this apparatus.

2659. KUČERJAVYH, E. G., and KOSTJUK, M. D. **Issledovanie kornevnyh sistem i transpiracii drevnyh porod. [A study of the root systems and transpiration rate of tree species.]** *Lesn. Hoz.* 5 (5), 1952 (29-35). [Russ.]

Summary of a study of root systems, transpiration rate and assimilation surface of *Quercus robur*, *Fraxinus pennsylvanica*, *F. excelsior*, *Acer platanoides*, *A. tataricum* and *Caragana arborescens* in 4-, 13- and 20-year-old plantations of the Veliko-Anadol' forest, Ukraine. The climate is continental with a mean annual rainfall of 400 mm., and the soil a heavy chernozem overlying clay rich in CaCO_3 . To study the root systems, soil monoliths (25×20 cm. and 1 m. high) were cut on both sides of a tree from a trench ca. 2-8 m. deep, and divided into 20-cm. layers. Extracted roots were washed and their oven-dry weight calculated for each of the 20-cm. layers and for 3 classes of root thickness, the whole being tabulated according to age of plantation. In 20-year plantations the Oak (mean height 8.6 m.; mean d.b.h. 8.4 cm.) had a well developed root system with a tap root penetrating deep into the soil; a thin layer of humus lining the channels formed by the latter indicates that the roots assist the percolation of water which, in turn, by depositing humus particles in the deeper layers, stimulates root activity. *F. pennsylvanica* and *A. platanoides* differed from Oak chiefly in their greater development of lateral roots and their less pronounced tap roots. Most of the root weight of all the species investigated was

concentrated in the topmost 40 cm. of soil; the bulk of the root weight of *F. excelsior* (66.7%) and *C. arborescens* (84%) was found in the top 20 cm., presumably intercepting the percolating rain-water, to the prejudice of the Oak. Transpiration rates were determined daily on 13- and 20-year-old trees of *Q. robur*, *F. excelsior*, *F. pennsylvanica* and *A. platanoides* during July-Aug. from 8 a.m. to 5 p.m., in direct sunshine, at temperatures of 17-31° C. Branchlets from sample trees (Kraft classes I and II) were cut, weighed, fastened by clips to poles, held for 2.5 minutes in their original position in the crown, and then re-weighed (Ivanov's method). Transpiration was calculated both per sq. m. of leaf surface (g./hour) and per tree (kg./hour). Results (tabulated) showed that for trees of both ages and both tree classes *F. excelsior* had the highest transpiration per unit of leaf surface and per tree. Oak had the lowest rate per unit surface but was second to *F. excelsior* in transpiration per tree. The high transpiration rate and consequently high moisture requirement of *F. excelsior* make it an unsuitable associate for Oak, whereas *A. platanoides* and *F. pennsylvanica*, having lower transpiration rates, can be safely grown with it. The assimilating surface of these species was determined by (a) cutting two sample trees from each of two classes in 13- and 20-year plantations (class I, well developed trees; class II, average trees), (b) dividing their crowns into three tiers (upper, middle and lower) and weighing the foliage of each, (c) measuring the surface of 100 leaves from each tier, then weighing them to get a mean weight/surface ratio. Results showed that *F. excelsior* had the largest assimilating surface, then in descending order, *Q. robur*, *A. platanoides* and *F. pennsylvanica*. Class I trees had a 15-20% larger assimilating surface than class II. Finally the moisture content of both leaves and woody tissues of this same population was determined by fresh and oven-dry weighings (leaves taken from the middle of the W. side of the crown: wood, as sawdust, from the stems at b.h.). Oak had the highest m.c. of both leaf and wood; then, in descending order, *F. excelsior*, *F. pennsylvanica* and *A. platanoides*.

2660. BASTIN, R. **La photosynthèse. [Photosynthesis.]** *Bull. agric. Congo belge* 45 (6), 1954 (1499-1524). 66 refs. [F.flem.]

A summary of modern views under: significance, origin and efficiency in the use of energy; apparatus (leaf, chloroplast, grana); physiological pointers; nature of photochemical, and of enzymatic phases; photolysis of water; experiments *in vitro*; place in general metabolism of green plants. Of 66 references given, 50 were published since 1939.

2661. NAKANO, M., and KOZIMA, H. **[Fundamental experiments on natural regeneration (V). Effects of sunlight intensity on starch metabolism (Preliminary).]** *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (59-63). [Jap.e.]

Illustrates graphically for *Abies mayriana* and *Larix leptolepis*, with English captions, the relation between sunlight intensity and starch metabolism and the diurnal variation of the latter for 100, 75 and 25% lighting between 06.00 and 18.00 hours.

Relations with humidity, temperature and soil water will be reported later.

2662. DECKER, J. P. The effect of light intensity on photosynthetic rate in Scotch Pine. *Plant Physiol.* 29 (3), 1954 (305-6). 7 refs. O.R.E.

The shoot of a seedling was enclosed in a chamber consisting of a glass-topped cylinder of sheet-iron resting on a heavy brass plate. Air within the chamber was circulated by a small motor-driven fan and its temperature kept constant by passing cold tapwater through copper tubing soldered to the wall and base plate. The shoot chamber, an infra-red gas analyser, and an air pump were connected in a closed series by plastic tubing. The analyser served as a direct-reading meter that indicated continuously the CO_2 concentration of the air enclosed with the plant. A seedling was sealed in the chamber and allowed to stand ca. 10 min. under full light. A quantity of CO_2 was introduced into the system to raise the concentration slightly above 0.045%. The time required for it to fall from 0.045% to 0.034% was recorded. The illumination was then reduced to the next level and the procedure repeated. Photosynthetic rate of Scots Pine was shown to be a linear function of illumination over the range 1800 to 6400 ft.-candles. Below 1800 ft.-candles it dropped more steeply. The curve is similar to that obtained for Loblolly Pine [cf. *For. Abstr.* 6 (p. 75)] but a comparison of the curves illustrates the greater precision of the method used for Scots Pine.

2663. CLARK, J. The immediate effect of severing on the photosynthetic rate of Norway Spruce branches. *Plant Physiol.* 29 (5), 1954 (489-90). 7 refs. O.R.E.

Reports experiments to determine whether the photosynthetic rate of Spruce branches changed during the period immediately following their detachment from the tree. In addition, a study was made of the effect of clipping the needles of the current year from twigs as compared with the effect of removing the entire current year's twigs. The results show that there was no change in the photosynthetic rates of Spruce branches for 20 min. following detachment from the tree, and probably none for 90 min. The 2 methods of artificial defoliation differed negligibly in their effects on apparent photosynthesis.

2664. PARKER, J. Differences in survival of excised *Ponderosa* Pine leaves of various ages. *Plant Physiol.* 29 (5), 1954 (486-7). 7 refs. O.R.E.

Leaves allowed to stand in the laboratory, whether attached to cut branches or removed from them, showed definite gradations in rates of mortality with increasing age; the older the leaves, the more rapidly they died. This mortality rate was closely related to a rapid drop in weight in the older leaves, as compared with a slower drop in the younger ones. The weight decrease is believed to be caused by water loss. *From author's summary.*

2665. PISEK, A., and LARCHER, W. Zusammenhang zwischen Austrocknungsresistenz und Frosthärte bei Immergrünen. [Relationship between drought resistance and frost hardness in evergreens.] *Protoplasma*, Wien 44 (1), 1954 (30-46). 24 refs. [G.g.] L.S.

Needles and leaves of *Pinus cembra*, *Picea abies*, *Rhododendron ferrugineum*, *Loiseleuria procumbens*, *Arctostaphylos uva-ursi* and *Hedera helix* were allowed to dry out at intervals over a period of 2 years in temperatures characteristic of the season, and the degree of drought resistance shown by the plasma, i.e. resistance to injury in the face of high moisture loss, was determined. The values were expressed as moisture content (calculated on dry weight) of the leaf or needle when injury amounted to 1-2% (critical m.c.), 10% (sublethal m.c.), and 33%. Drought resistance, when plotted, showed a seasonal rhythm, increasing in autumn, at its height throughout the winter, and gradually sinking in spring. The differences between the two extremes varies widely from species to species. When the drought-resistance patterns were compared with seasonal patterns for frost resistance, a general conformity was found, and it is deduced that both depend fundamentally on characteristics of the plasma.

2666. SIMINOVITCH, D., and BRIGGS, D. R. Studies on the chemistry of the living bark of the Black Locust in relation to its frost hardness. VII. A possible direct effect of starch on the susceptibility of plants to freezing injury. *Plant Physiol.* 29 (4), 1954 (331-7). 8 refs. O.R.E.

With the onset of low autumnal temperatures, a simultaneous decrease in starch content and an increase in soluble sugar content is observed in living bark cells of the Black Locust [*Robinia pseudoacacia*]. An increase in soluble protein content precedes or accompanies the decrease in starch content. An accompanying increase in frost-hardiness of the cells is largely associated with the protein change, but in circumstances where the protein change is minimal or zero during the time interval of the carbohydrate conversion, some increase in hardness is observable during the starch/sugar-content change. Evidence is presented that variations in soluble sugars in the bark tissue at other times bear no relationship to the frost-hardiness of the cells. It is proposed, therefore, that the small but discernible hardness change which accompanies the disappearance of starch is due to a detrimental effect exerted by the starch itself, at higher concentrations, on the dehydrated cells. Such an effect is shown to be possible in view of the mechanism by which frost injury is produced in the cells; the starch granules serve to enhance stress and distortion effects in the protoplasm as engendered, through dehydration, by the freezing process. It is suggested that readily reversible changes in frost-hardiness, reported as occurring in tissues of some woody plants in response to temperature fluctuations, could be due in part to the temperature-sensitive variations in the level of the starch content of these tissues. [Cf. *For. Abstr.* 16 (No. 93).] *From authors' summary.*

2667. EWART, M. H., SIMINOVITCH, D., and BRIGGS, D. R. Studies on the chemistry of the living bark of the Black Locust in relation to its frost hardness. VIII. Possible enzymatic processes involved in starch-sucrose interconversions. *Plant Physiol.* 29 (5), 1954 (407-13). 30 refs. O.R.E.

An investigation was made into the possible rôle of phosphorylase in this process. Samples of the living bark tissue were analysed for inorganic phosphate and for acid labile phosphate (glucose-phosphate) at various times throughout the growing season. The observed ratios of inorganic phosphate to glucose-1-phosphate were unfavourable to the production of starch in all samples, including those in which starch was actually accumulating. This result suggested that some reaction other than the phosphorylase reaction was responsible for the synthesis of starch in this tissue. Starch synthesis was demonstrated histochemically in sections of the living bark tissue by infiltrating them with a solution of glucose-1-phosphate. The inclusion of inorganic phosphate in the solution strongly inhibited this synthesis which, it is suggested, is an abnormal reaction. The evidence indicates that phosphorylase is not involved in the synthesis of starch or the conversion of sucrose to starch, but it probably has a rôle in the normal metabolic breakdown of starch or in the low-temperature conversion of starch to sucrose. *From authors' summary.*

163. Embryology

2668. RAO, C. V. Embryo development in *Areca* Nut [*Areca catechu*]. *Nature, Lond.* 175 (4453) 1955 (432-3). 2 refs.

2669. SHUKLA, R. D. Gametophytes in *Balsamodendron* [*Commiphora*] *mukul* Hook. *Curr. Sci.* 23 (10), 1954 (333). 3 refs. A.P.B.

164. Morphology

See also Nos. 2687, 2695, 2706, 2772, 3339, 3598.

2670. GUÉRINDON, A. La mise en évidence et le fonctionnement de l'anneau initial chez les plantules de *Pinus maritima* Poir. [Demonstration of the initial ring in seedlings of *P. pinaster* and its function.] *C.R. Acad. Sci., Paris* 239 (22), 1954 (1526-9). 5 refs. [F.] O.R.S.

An annular region of great mitotic activity was found in the apical meristem of seedlings. This initial ring gives rise to 7 leaf helices in seedlings with 7 cotyledons.

2671. WÓYCICKI, S. On the origin of the *Retinospora* forms in *Thuja*, *Biota* and *Chamaecyparis*. *Acta Soc. Bot. Polon.* 23 (3), 1954 (443-58). 14 refs. [E.] O.B.D.

Experiments to find whether juvenile forms of *Thuja occidentalis* and *T. orientalis* can be perpetuated by means of cuttings from seedling shoots with needle leaves, gave negative results, the cuttings passing through the normal stages of foliage development. It seems likely therefore that the *Retinospora* forms of these species and of *Chamaecyparis* spp. have arisen spontaneously as 'sports', either as seedlings that retain their juvenile form or as shoots with juvenile foliage that appear from time to time on mature specimens.

2672. SCHAFFALITZKY DE MUCKADELL, M. Juvenile stages in woody plants. *Physiol. Plant., Copenhagen* 7 (4), 1954 (782-96). 67 refs. [E.e.]

Defines what is meant by a juvenile level, reviews the literature, and shows that there is a well defined

juvenile stage in *Fagus sylvatica*, the main character being ability to retain most of the withered leaves during the winter.

2673. PRAY, T. R. Foliar venation of angiosperms. II. Histogenesis of the venation of *Liriodendron* [*tulipifera*]. *Amer. J. Bot.* 42 (1), 1955 (18-27). 8 refs. O.B.D.

Cf. *For. Abstr.* 16 (No. 1412).

2674. NAGARAJ, M. Contributions to the floral morphology of *Terminalia catappa*. *Curr. Sci.* 23 (12), 1954 (408). A.P.B.

165. Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation

See also Nos. 2700, 2706, 2717, 2723, 2771, 2778, 2783-4, 2794, 2874-5, 3033, 3357, 3414.

2675. RIEGER, R., and MICHAELIS, A. Genetisches und cytogenetisches Wörterbuch. [Genetical and cytogenetical dictionary.] *Züchter, Spec. Issue* No. 2, 1954. pp. 140. 7 pp. of refs. [G.] Price DM23-50. E.M.B.

Contains definitions of 2500 English and German terms alphabetically arranged, with some explanatory diagrams, and where possible the authority and date of the definition. There is an extensive list of references to literature used in compiling the dictionary.

2676. NYGREN, A. Apomixis in the angiosperms. II. *Bot. Rev.* 20 (10), 1954 (577-649). 15 pp. of refs.

A supplement to the paper by G. L. Stebbins [see *For. Abstr.* 3 (p. 289)], reviewing further literature on this subject. The arrangement is by families.

2677. WILDE, S. A. Soils and forest tree breeding. *J. For.* 52 (12), 1954 (928-32). 25 refs.

The importance of the inter-relationship of tree and soil in the study of forest genetics is discussed with many examples and references, under the following heads: soil as a factor in natural selection; the selection of superior trees; progeny tests, seed orchards and genetical arboreta; development of hybrids; plantation of élite clonal and hybrid stock.

2678. ALJBENSKIÏ, A. V., et al. Selekcija drevesnyh porod. [The selection and breeding of woody species.] Goslesbumizdat, Moscow and Leningrad. 1950. pp. 228. Many refs. [Russ.] Price Roubles 11-20.

A symposium, consisting of the following papers reviewing Russian work in this field: (1) Application of Micurinist methods in the selection and breeding of woody species (A. V. Aljbenskiï; pp. 7-25); (2) Remote hybridization as a means of producing new Oaks (S. S. Pjatnickii; pp. 26-107; 53 refs.), describing work done by the author since 1937 and including a rather detailed account of techniques used, crosses made, the most interesting of the hybrids raised, and some observations on transpiration and photosynthetic activity in certain of the hybrids; (3) New forms of fastigate White Poplars (A. S. Jablokov; pp. 108-53; 9 refs.), dealing with hybrids produced since 1936 between *Populus bolleana* and species of the same and other sections of the genus; (4) The selection and breeding of *Juglans regia* (F. L. Ščepotjev; pp. 154-216; 59 refs.), an account of selection and hybridization—including

information on the biology of flowering and hybridization technique—for winter hardiness and nut quality; (5) Selection and breeding of *Rosa* spp. (N. P. Popov-Dekator; pp. 217–28; 8 refs.), with special reference to the vitamin-C content of their fruit.

2679. Šlechtění lesních dřevin. [The selection and breeding of woody species.] *Lesn. Knihovna (malá rada)* No. 27, 1953. pp. 195. Many refs. [Cz. or Slovak.] Price Kčs. 10-65.

Translated from the Russian originals in 'Selekcija drevesnykh porod' [see preceding abstract]. Contains also articles from *Trud. Inst. Lesa*, on: The present status and development of tree breeding and forest seed supply (L. F. Pravdin); Methods of sexual hybridization of trees; and Results of hybridization of Larch, Sycamore Maple, Elm and Ash (A. V. Aljibenskii); Results of breeding Poplars at Leningrad (P. L. Bogdanov); New Poplar hybrids; Overcoming the inability of Poplars to produce hybrids by low temperatures and darkness (A. I. Žurbin); Analysis of a *Quercus robur* population in accordance with a phenological characteristic (A. E. Kotjukov); Results of an investigation on Karelian Birch (N. O. Sokolov); Effect of site conditions on the fertility of *Pinus sylvestris* and *P. pallasiana* (V. M. Rovskii); Obtaining vegetative hybrids of conifers by grafting (A. I. Severova); Breeding of late-flowering Walnuts (A. F. Zarubin); Selection of seed and method of raising seedlings (A. M. Ozol); and Geographical variability of trees and its use in forest tree breeding and forest seed supply (V. M. Obnovlenskii).

2680. BOUVAREL, P. L'amélioration des arbres forestiers en Suède et au Danemark: rapport de mission, juillet 1953. [Forest tree breeding in Sweden and Denmark: report of a mission, July 1953.] *Ann. Éc. Eaux For. Nancy* 14 (1), 1954 (153–220 + 23 photos). 38 refs. [F.e.g.]

2681. MERGEN, F., and POMEROY, K. B. Tree improvement research at the Lake City, Florida, research center: a project analysis. *Sta. Pap. Southeast. For. Exp. Sta.* No. 45, 1954. pp. 59. 53 refs.

Discussion of major problems; review of past and current work; discussion of needed information and of research aspects; and an outline of the proposed programme.

2682. KLEINSCHMIT, R. Einzelstammabsaaten von Plusvarianten der europäischen Lärche (*Larix decidua* Miller) aus frei abgeblühtem Saatgut als Hilfsmittel zur Beurteilung der Erbanlagen. [The use of single-tree progenies of plus variants of *L. decidua* raised from free-pollinated seed, as a means of assessing inherited characteristics.] *Z. Forstgenet.* 4 (1), 1955 (1–15). 15 refs. [G.e.f.]

Presents the results of a statistical analysis of the most important morphological characteristics—height growth, spread of crown, branch angle, length and number of side branches—in 2-year-old progenies derived from the free pollination of 14 plus trees selected from plantations of *L. decidua*. Two extreme form types can be distinguished: (1) slender growth habit, with a small branch angle, small crown spread, numerous fine side branches and rather smaller, light green needles, and (2)

broad growth habit, with a wide branch angle, wide crown spread, few but vigorous side branches, without long shoots from the base, leader strongly developed, and somewhat larger, grey-green needles. At this age (1) seems to be connected with good height growth. From the frequency distribution and the average values of the characters studied, both the individual tree progenies and the various provenances can be distinguished one from another, according to the more pure or mixed nature of the form types. The form types seem to provide a useful aid in breeding because of their association with branchiness and rate of growth. *From author's summary.*

2683. JAMBLINNE, A. DE. Hybridations expérimentales dans le genre *Pinus*. I. Croisement expérimental entre *Pinus nigra* Arnold et *Pinus sylvestris* L. [Experimental hybridization in the genus *Pinus*. I. Crosses between *P. nigra* and *P. sylvestris*.] *Z. Forstgenet.* 3 (6), 1954 (126–30). 13 refs. [F.i.g.e.]

Successful crosses were made in both directions. The mean weight of seed from the hybrid was considerably greater than that of seed from *P. nigra*, the parent with the heavier seeds. *From author's summary.*

2684. MERGEN, F. Inheritance of deformities in Slash Pine. *St. Lumberm.* 190 (2370), 1955 (30–2). [Southeastern Forest Experiment Station.]

Eight-year-old progeny from a crooked tree by wind pollination or controlled pollination using 2 normal trees as ♂ parents showed a significantly higher % of trees with sweep, than progeny from other crosses in which the 2 normal trees served as ♀ parents. Results are illustrated by photographs.

2685. ŠČEPOTJEV, F. L., and POBEGAĬLO, A. I. Izučenie žiznedejatel'nosti pylyč černogo oreha (*Juglans nigra* L.) v iskusstvennoi srede (in vitro). [The viability of *J. nigra* pollen in an artificial medium (in vitro).] *Dokl. Akad. Nauk SSSR* 98 (2), 1954 (289–91). 3 refs. [Russ.] A.P.B.

Briefly describes several experiments made under the Ukrainian Research Institute for Forestry and Forestry in Combination with Agriculture, Kharkov, in connexion with Walnut breeding work. (1) The best medium, giving 91% germination, was 0.5N glucose + 1% agar and 0.001% H_3BO_3 . (2) Preliminary tests indicated wide variation in pollen viability for individual trees. (3) Holding the pollen in 100% atmospheric humidity (at 19°C.) for ½–1 hour before 'sowing', increased its germinative energy; longer periods, however, resulted in a marked decrease. (4) For storage, pollen should be kept cool (on ice) at ordinary humidities, not over $CaCl_2$ in a desiccator nor under ordinary room conditions. [Cf. *For. Abstr.* 14 (No. 86).]

2686. Genetics and plant breeding [in certain tan Wattles]. *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (16–9). 1 ref.

[Cf. *For. Abstr.* 15 (No. 1107).] Notes on work done in breeding (Green Wattle, interspecific hybrids, selfed Black Wattle); tetraploidy (recognition by stomatal size); progeny testing (inter-correlations of bark yields, diam. and ht. growth, etc.).

2687. CLIFFORD, H. T., and BINET, F. E. A quantitative study of a presumed hybrid swarm between *Eucalyptus elaeophora* and *E. gonio-calyx*. *Aust. J. Bot.* 2 (3), 1954 (325-36). 15 refs. O.B.D.

[*Cf. For. Abstr.* 16 (No. 1441).] From measurements of fruit lengths, fruit weights, and lengths of fruiting umbels of trees from the species *E. elaeophora* and *E. gonio-calyx* and their presumed hybrid swarm, a formula is calculated for taxonomic classification using statistical discriminant theory. The rates of misclassification expected with the use of this formula are estimated. A simple geometrical model of the relationship of the species and the hybrid is investigated. *Authors' summary.*

2688. KRAHL-URBAN, J. Buchenrassenstudien im Bayerisch-Böhmischen Wald, in den Bayerischen Alpen und in den Karawanken. [*Strains of Beech in the Bavarian-Bohemian forest, the Bavarian Alps, and the Karawanken Mountains.*] *Forstwiss. Cbl.* 73 (9/10), 1954 (309-25). 23 refs. [G.g.]

Results of investigations into the characteristics (mainly of form) of Beech in these regions.

2689. IRGENS-MOLLER, H. Forest tree genetics research: *Quercus* L. *Econ. Bot.* 9 (1), 1955 (53-71). 112 refs.

A summary account of past work, with some references to work in progress at Harvard. Taxonomy, utilization, hybridization, speciation, selection, breeding technique, biology of fertilization, vegetative propagation, cytology, inheritance studies and racial differentiation are discussed.

2690. PJATNICKIĭ, S. S. Dub-zimnjak i dub-letnjak. ['Winter' and 'summer' Oaks [i.e. late- and early-flushing forms of *Quercus robur*].] *Priroda, Moskva* 42 (10), 1953 (97-102). [Russ.] [Har'kovskii Sel'skokochozjajstvennyiĭ Institut im. V. V. Dokuchaeva.] A.P.B.

A review of Russian literature, in general terms [and without a bibliography], along with some original observations and discussion by the author, on the early- (E) and late- (L) flushing forms of *Q. robur*, first described by Černjaev in 1858. The difference in flushing date is sometimes as much as 4-5 weeks. It is heritable, and some natural intermediates may be due to crossing, which could only occur with E as the ♂ and L as the ♀ parent in view of the brief period of receptiveness of the stigmas in this species. In artificial pollinations made by the author, all the F₁ progeny were early-flushing. Despite the occurrence of mixed natural populations, three separate ecotypes can be distinguished: L—characteristically on the richer soils, with adequate moisture, and at near the bottom of ravines and also on dark-grey clay-loams on the plateaux between ravines and on steep N. slopes; more resistant, owing to its late flushing, to spring frosts; E(1)—an upland form, characteristically on dry soils with sharp drainage; more tolerant of drought and often found on S.-S.E. aspects; liable to late-frost damage; E(2)—which flushes at the same time as E(1), is found on the floodplain of wide river valleys, with abundant moisture and a more equable temperature régime. The author's experiments [only conclusions are given] in which seedlings

of E(1) and L (seed from the same forest) were subjected to artificial drought, showed that the former were considerably more drought-resistant, transpired less, and had a higher photosynthetic activity under drought conditions, than the latter. E(2) is said to be even more moisture-loving than L. It is emphasized that these forms should be distinguished in seed collection and proper attention paid to their ecological characters, e.g. L should be reserved for moist, possibly frosty sites, where it is superior to E(1), which alone is suited to the severe drought conditions of forest-steppe and steppe shelterbelts.

2691. SUKAČEV, V. N. O pozdnepoimennykh èkotypah iv. ['Late-floodland' ecotypes of Willows.] *Dokl. Akad. Nauk SSSR* 92 (3), 1953 (675-8). 16 refs. [Russ.] A.P.B.

In the 1930's the author published some observations on forms of *Salix rossica* and *S. triandra* from the lower Volga floodplain, where flooding often persists until midsummer: when grown at Leningrad, these did not start growth until midsummer, and this character was transmitted to their progeny, whether vegetative or sexual, though various mechanical injuries or frost damage could cause an earlier start of growth. The present paper summarizes further observations to date. Similar late forms have since been found in other floodplain localities, and in *S. dasyclados*, but not in *S. alba*, perhaps owing to its greater stature and capacity for developing adventitious roots in water. Leaf and catkin development proceeds very unevenly in the late-floodland forms, so that at the end of July, a single bush may bear all stages from unopened buds to immature fruits. Their order of flushing in cultivation at Moscow differed entirely from that of local forms of the same species; the late-floodland forms, moreover, flushed at about the same time in cultivation at places as far apart as Leningrad, Moscow and the S. of Kursk. They also showed foliar dimorphism, the first leaves to develop from the buds being conspicuously broader, obovate-lanceolate, and more obtuse than the later, normal leaves. The relation of these facts to evolutionary theories is briefly discussed.

2692. NILSSON, H. Über hochcomplexe Bastardverbindungen in der Gattung *Salix*. [Very complex hybrid crosses in the genus *Salix*.] *Hereditas, Lund* 40 (3/4), 1954 (517-22). 8 refs. [G.] O.R.S.

Discusses the results obtained from octonary and 13-nary crosses.

2693. KOLTAY, G., and KOPECKY, F. Öshonos nyáraink leromlott öröklöttségének megjavítása. [Improvement of the deteriorated indigenous stock of Poplar in Hungary.] *Erdsz. Kutatás., Budapest* No. 2, 1954 (65-86). 15 refs. [Hu.]

Questions the value of most introduced Poplars as compared with the indigenous Grey Poplar (*Populus canescens*) in Hungary, urging that, in future, selection of indigenous forms, or crosses having the indigenous forms as one parent, should be preferred. White Poplar is said always to have coloured heartwood, whereas that of Aspen is white and that of hybrids between the two, usually intermediate in varying degree. The authors have

found Grey Poplars with white wood in 6 localities, material from which is being propagated by suckers or grafts. Crosses are being made with *P. bolleana* in an effort to improve growth form and drought resistance. In crossing experiments it has been found important to maintain the greenhouse temperature at 12–18° C. until after the first week of seed ripening, to prevent dropping of the catkins. The hybrid progeny present a wide range of forms (leaf, crown, tomentum, colour of bark). The growth of the *P. alba* × *P. bolleana* hybrids exceeds that of all other species. The first-summer plants are 160–200 cm. high.

2694. MÜLLER, R. Beitrag zur Beurteilung der *P[opulus] trichocarpa*. [Contribution to a review of *P. trichocarpa*.] *Z. Forstgenet.* 4 (1), 1955 (16–7). [G.g.e.f.]

Old existing trees of *P. trichocarpa* in Germany seem almost certainly to be of one clone. From recent material originating in cuttings from the U.S.A., 3 clones were selected, differing from each other in leaf shape, transverse section of the shoot, branch angle, number of branches, colour of the shoot, ribbing on the stem, and other characteristics. Material from Belgium was also found to differ in growth habit and rhythm from that of German provenance. The author concludes that with a suitable selection of clones *P. trichocarpa* could be grown as successfully in Germany as in the U.S.A. *From author's summary.*

2695. RICHENS, R. H. *Studies on Ulmus: I. The range of variation of East Anglian Elms. Watsonia* 3 (3), 1955 (138–53). 28 refs. [Commonwealth Bureau of Plant Breeding and Genetics, Cambridge.]

Describes a technique for analysing the taxonomic variation of these Elms, based on systematic sampling of the boundary hedges of ancient parishes. Leaf characters (5 quantitative, 1 qualitative) were determined for each sample, and the degree of affinity between samples was ascertained by a graphical method based on an application of the *t* test. Eleven taxonomic groups could be distinguished, together with a number of subgroups. The 3 major species *U. glabra*, *U. carpinifolia* and *U. procera* were fairly satisfactorily distinguishable, but groups here recognized both cut across and transcend the segregates of *U. carpinifolia* recognized in the new *Flora of the British Isles*. It seems probable that *U. carpinifolia* is composed of a large number of distinguishable clones, and it is doubtful whether any useful purpose is served by applying Latin names to assemblages of these. A method of characterizing the clones and clonal groups numerically is described. The distribution and history of the 3 major species is discussed. *From author's summary.*

166. Economic Botany (General)

See also section 892.

2696. Las plantas cultivadas en la Tierra del Fuego. [Plants cultivated in Tierra del Fuego.] *Idia* No. 80, 1954 (1–40). 53 refs. [Span.] C.G.B.

Summarizes information on topography, vegetation, climate and soils, and presents an annotated

list of species (including woody species) found growing both out of doors and under cover.

168. Histology

See Nos. 2670, 2673, 3339 *et seq.*, 3520, 3598.

17. SYSTEMATIC BOTANY

See also Nos. 2687, 2695.

2697. LITSCHAUER, R. VON. *Vocabularium polyglottum vitae silvarum: waldbiologisches Fachwörterbuch auf der Grundlage der wissenschaftlichen Nomenklatur. [Polyglot vocabulary of forest biology: forest biological technical dictionary based on scientific nomenclature.]* Verlag Paul Parey, Hamburg and Berlin, 1955. pp. 126. Price DM20.

The 990 entries in the main list, arranged by the specific scientific name with German, English, French, and Russian equivalents, include trees, herbs, fungi, mammals, birds and insects. There are separate indexes for the different languages, cross-referenced to the entries in the main list.

172.8 Eumycetes (True Fungi)

See also Nos. 3123 *et seq.*, 3520 *et seq.*

2698. AINSWORTH, G. C., and BISBY, G. R. *A dictionary of the fungi.* Commonwealth Mycological Institute, Kew, Surrey. 4th ed., 1954. pp. viii + 475. Price 20s.

A new edition without radical revision [see *For. Abstr.* 7 (No. 1655)]. The main changes since the 3rd edition of 1950 are those arising from the application of the new International Code of Botanical Nomenclature.

2699. REIHERT, I., and HERSHENZON, Z. [Mushrooms of the forests of Israel.] *Hayaar* No. 4, 1955 (1–18, II). 8 refs. [Heb.e.]

Describes the higher fungi.

2700. TAKEMARU, T. *Genetics of Collybia velutipes, I. Mating type and barrage phenomenon* (2). *Bot. Mag., Tokyo* 67 (789/790), 1954 (84–6). 28 refs. [E.e.] I.M.I.

A mating experiment using 21 monosporous mycelia of *C. velutipes* shows the fungus to be heterothallic and tetrapolar, confirming work by Vandendries, *et al.*

2701. FÄHRÆUS, G. *Further studies in the formation of laccase by Polyporus versicolor.* *Physiol. Plant., Copenhagen* 7 (4), 1954 (704–12). 10 refs. [E.e.]

Cf. *For. Abstr.* 14 (No. 72).

174. Spermatophyta, Seed-Plants in General. Floras and Check-Lists

2702. PARDY, A. A. *Notes on indigenous trees and shrubs of Southern Rhodesia. Reprs. from Rhod. agric. J.* 51 (6), 1954. Each pp. [1] + 2 plates. (*Bull. Minist. Agric. Lds., S. Rhod.* Nos. 1796–1799.)

Acacia subulata, *Bersama abyssinica*, *Spirostachys africana*, and *Trichilia emetica*.

2703. BENSON, L., and DARROW, R. A. *The trees and shrubs of the Southwestern deserts [of the U.S.A.].* University of Arizona Press, Tucson,

Arizona. 2nd ed. 1954. pp. x + 437 + 34 plates. Price \$8.50 (68s.).

2704. Daftar pohon-pohonan 'Djambi' (Sumatera). [List of tree species collected in Jambi (Sumatra).] *Rapp. Bosbouwproefsta., Bogor* No. 8a, 1954. pp. 24. [Jav.e.]

A revision of an earlier list [see *For. Abstr.* 12 (No. 992)]; the list is in two parts arranged (1) by local names and (2) under family, genus and species. Each part gives the local name, its language or dialect, scientific name and durability class of the wood.

174.2./7. Gymnosperms

See also Nos. 2671, 2732, 3356, 3360.

2705. GÖKMEN, H. Gymnosperm'er. [Gymnosperms.] *Tar. Bak. (Vek.) Örm. Gen. (umum) Müd. Yay.* No. 143, 1953. pp. 325 + 1 map. 50 refs. [Turk.]

A manual on orthodox lines but with many original illustrations and a map (1 : 2,000,000) showing the distribution of the main Turkish forest species. Forty of the references are Turkish.

2706. CUCCHI, C. C. Contributo alla morfologia del genere *Cedrus* (Trew.) Link. [The morphology of the genus *Cedrus*.] *Delpinoa, Napoli* 6, 1953 (117-72 + 7 plates). [It.e.] L.S.

Deals with the systematic position of *Cedrus* in the Pinaceae, descriptions of the 4 *Cedrus* spp. and their range, morphology related to the east-west extension of the genus, pollen-grain morphology compared with that of *Larix*, *Pseudolarix*, and *Pinus*, and phylogeny and affinities with *Larix*, *Pseudolarix* and *Pinus*. From author's summary.

2707. HANEY, G. P. [Compiler]. Shortleaf Pine [*Pinus echinata*] bibliography. *Sta. Pap. Stheast. For. Exp. Sta.* No. 48, 1955. pp. 60.

Covers literature from 1900 to June 1954, is arranged under broad subject heads and has an author index.

2708. PIEROVICH, J. M. What's in a name? Notes on *Pseudotsuga menziesii*. *J. For.* 52 (12), 1954 (905-9). 26 refs.

Discusses 7 important name changes in the 1953 U.S. Forest Service check list, decides that 6 are reasonable, and indicates that the change for Douglas Fir may be invalid and discusses proposed simplifying amendments to the International code.

2709. MELVILLE, R. The Podocarps of East Africa. *Kew Bull.* 1954 (1955), (563-74).

A taxonomic review, with key to species and varieties recognized and description of *P. ensiculis* sp. nov., a tree to 30 m. tall in the W. Usambaras, Tanganyika. *P. dawei* is reduced to a var. of *P. usambarensis*, and *P. ulugurensis* is regarded as no more than a state of *P. milanjanus*.

175.2. Monocotyledons

2710. MCCLURE, F. A. A new Bamboo and a new record for Guatemala. *Phytologia* 5 (3), 1954 (81-2). A.P.B.

Arthrostylidium barlettii sp. nov. and *Guadua spinosa* comb. nov.

176.1. Dicotyledons

See also Nos. 2687, 2689, 2695, 2724, 2727, 2733, 3339, 3344-7.

2711. SHERFF, E. E. Revision of the genus *Cheirodendron* Nutt. ex Seem. for the Hawaiian Islands. *Fieldiana (Bot.)* 29 (1), 1954 (1-45).

2712. VERDCOURT, B. Notes on the Tropical African Canellaceae. *Kew Bull.* 1954 (1955), (541-4).

The taxa dealt with are *Warburgia stuhlmannii* (neotype, from near the original locality; with very full field description); *W. ugandensis* (now regarded as distinct from the preceding); *W. ugandensis* subsp. nov. *longifolia*, a large tree from S. Tanganyika; and *W. elongata* sp. nov., a small tree or shrub, from E. Tanganyika.

2713. MARTÍNEZ, M. Los encinos de México. IV. [The Oaks of Mexico. IV.] *An. Inst. Biol. Univ. Méx.* 25 (1/2), 1954 (35-64). [Span.] C.G.B. *Quercus oleoides*, *Q. decipiens*, *Q. platyphylla*, *Q. tuberculata*, *Q. conzattii*, *Q. elliptica*, *Q. conspersa*, *Q. acutifolia*, *Q. affinis*, *Q. castanea*. [Cf. *For. Abstr.* 15 (No. 3309).]

2714. ARISTEGUIETA, L. Árboles de Venezuela, el cuji yaque (*Prosopis juliflora* (Swartz) D.C.) [Trees of Venezuela. *P. juliflora*.] *Extr. from Agric. venez.* 19 (170), 1954 (38-40). [Span.]

2715. HALL, N., and JOHNSTON, R. D. How to use the card sorting key for the identification of Eucalypts. *Leaflet. For. Timb. Bur. Aust.* No. 68, 1954. pp. 30. Price, with key £A.5. 5s.

The key consists of: (1) a set of 551 cards clipped ready for use; (2) 25 blank cards; (3) a copy of Leaflet 68, explaining the use of the key; (4) one set of 31 plates (printed on one side only) of the buds and fruits of 486 species and varieties of Eucalypts; (5) one set of mimeographed sheets with a schedule of auxiliary information that can be added to the cards.

2716. GARDNER, C. A. Trees of Western Australia. No. 29—Woollybutt (*Eucalyptus miniata* A. Cunn. ex Schau.). No. 30—Gnaingar (*Eucalyptus phoenicea* F. Muell.). *Leaflet. Dep. Agric. W. Aust.* No. 2195, 1954. pp. 7. (Repr. from *Journal of Agriculture of Western Australia, Perth (Ser. 3)* 3 (5), 1954 (589-95).)

Botanical descriptions.

2717. GONZALEZ VAZQUEZ, E. Los chopos y sus maderas. Libro primero. Los chopos y sus cultivos. [Poplars and their timber. Book I. Poplars and their cultivation.] Ciudad Universitaria, Madrid. 1953. pp. xxxi + 318. 203 refs. [Span.] Price Ptas.200 [£2. 6s. 6d.].

This comprehensive work is presented in two parts. Part I deals with morphology and systematics, summarizes the work of the International Poplar Commission and achievements in the field of selective breeding, and describes the principal species, forms and hybrids. Part II deals at some length with the creation of Poplar stands, and reviews work achieved in Europe in Poplar cultivation. Information is also presented on production of timber and on pests and diseases. An appendix

gives a plan for the establishment and tending of a Populetum.

2718. MOLDENKE, H. N. Notes on new and noteworthy plants. XVIII. *Phytologia* 5 (3), 1954 (83-92). A.P.B.

Includes descriptions of new species of *Premna*, two of which are trees.

2719. MOLDENKE, H. N. Additional notes on the genus *Tectona*. I and II. *Phytologia* 5 (3), 1954 (112-20); 5 (4), 1955 (134-42). A.P.B.

I. Literature citations, synonymy, nomenclature and general notes on the genus *Tectona* and the species *T. grandis*.

II. Literature citations and synonymy relating to *T. grandis*, *T. grandis* f. *abludens*, *T. grandis* var. *glabrifolia*, *T. hamiltoniana* and *T. philippinensis*.

2720. MOLDENKE, H. N. Materials toward a monograph of the genus *Vitex*. *Phytologia* 5 (4), 1955, (142-76). A.P.B.

2721. STAELEU, F. A. A monograph of the Vochysiaceae. IV. *Erismia*. *Acta bot. neerland.* 3 (4), 1954 (459-80). 53 refs. [E.] O.B.D.

Cf. *For. Abstr.* 15 (No. 1151).

18. PLANT ECOLOGY

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 2794, 2811.

2722. REICHELTE, H. Standortsansprüche und waldbauliches Verhalten der Holzarten. [Site requirements and silvicultural behaviour of tree species.] *Wald* 2 (3), 1952 (93-4). [G.]

Presents a table designed to illustrate broadly the site requirements and silvicultural characteristics of the 24 common German species listed.

2723. MAYER, H., and PLOCHMANN, R. Natürliches Vorkommen und künstlicher Anbau der Lärche in zwei bemerkenswerten Waldgebieten Südbayerns, Berchtesgadener Land und Frankenjura. [Natural occurrence and artificial establishment of Larch in two important forest regions of southern Bavaria, the Berchtesgaden region and the Franconian Jura.] *Forstwiss. Forsch.* No. 4, 1954. pp. 68. Many refs. [G.g.]

The work is in two parts: (1) Larch in the forest communities of the Berchtesgaden limestone Alps (H. Mayer): a study of site, biotic influences, present distribution of Larch, ecology and the occurrence of ecotypes and their characteristics, viz. growth, bark, branch habit, cones, wood properties and site requirements. Two distinct phenotypes can be clearly distinguished: (a) lower montane Larch, a tree with early rapid growth, thin bark and few branches, and (b) higher montane Larch with slow early growth, thick bark and branchiness. This type is susceptible to canker. The former can be recommended for the extra-alpine Beech and Beech/Oak mixed forests of southern Germany. (2) Afforestation with Larch in the southern Franconian Jura (R. Plochmann): information on the occurrence and yield of Larch on different sites, its site requirements, growth habit and the occurrence

and causes of canker. Although canker is found on all sites, Larch can be recommended for afforestation throughout this region, except on cretaceous sand. Recommendations are made on choice of site and races, and on afforestation technique.

2724. PLUMMER, G. L. *Cercis canadensis* L.: an ecological life history. *Abstr. of thesis, in Dissert. Abstr.* 14 (12), 1954 (2187-8). [Purdue University.] O.R.S.

Information on taxonomic status, importance, distribution, environment, growth, flowering dates, reproduction and recognition on air photographs is drawn from literature, greenhouse experiments and field observations. The following conclusions are drawn: (1) The typical pubescent-leaved variety *C. canadensis* var. *typica* and its glabrous-leaved form *C. canadensis* f. *glabrifolia* respond to environmental conditions in Indiana as a single entity. There is evidence suggesting geneecological variations of the species and the typical variety, especially in tolerance to sunshine and to cold in the southern states. (2) It is a heliophyte in Indiana. (3) Its prominent status in secondary succession of cut-over highly calcareous areas may be due to its greater tolerance of nutritional deficiencies on alkaline soils. (4) It is very sensitive in its flowering habits to cold, and a comparison of climatological data and flowering dates shows that it needs 30 days of temperatures averaging over 50-52° F. Winter chilling increases its flowering ability. There is some doubt as to the part played by insect visitors in hybridization, because it is self-fertile and has a self-pollinating adaptation. (6) Crown coverage was estimated from coloured air photographs taken in S.E. Indiana to approach 20-25% on areas of 10-12 acres and it may be higher as the size of the area is reduced.

2725. GÖHRE, K. [Editor]. Die Robinie (falsche Akazie) und ihr Holz. [*Robinia pseudoacacia* and its wood.] Deutscher Bauernverlag, Berlin. 1952. pp. 344. 177 refs. [G.] Price DM13.50.

Comprises the following sections: Growth and yield of *Robinia* in the German Democratic Republic (W. Erteld; pp. 15-148) [see *For. Abstr.* 15 (No. 1655)]; The root system of older *Robinia* (A. Scamoni; pp. 151-60); Structure of *Robinia* wood (J. Liese; pp. 163-71); Technological properties and value of *Robinia* wood (K. Göhre; pp. 175-268); Diseases of *Robinia* (J. Liese; pp. 271-83); and Animal pests of *Robinia* (W. Kruehl; pp. 287-326).

2726. OTTER, M. Le cerisier, son importance sylviculturale et son traitement. [The Cherry [*Prunus avium*?]: its silvicultural importance and treatment.] *Schweiz. Z. Forstw.* 105 (12), 1954 (697-711). 12 refs. [F.g.]

In a study made in the mixed deciduous sub-montane forest near Zürich, the best developed trees were found in the *Querceto-Carpinetum aretosum*. In all the Cherry trees examined, the crown length was 30-35% of total height. The potential economic value of the tree is discussed, and methods of regeneration and tending described.

2727. JOACHIM, H. F. Beiträge zur Kenntnis von *Populus euramericana* forma *gelrica* Houtzagers. [Information on *P. euramericana* f. *gelrica*.] *Arch. Forstw.* 3 (1/2), 1954 (23-36). 9 refs. [G.g.]

The 'Weissappel', a hybrid now in extensive cultivation in the Spreewald district of Germany, probably arose spontaneously there 80 or 90 years ago. To distinguish the type, the name '*P. eur-americana* f. *gelrica*—Spreewald' is suggested. In contrast to Houtzagers' type, all flowers appear to be ♀. Time of flushing and leaf-fall agree. The bark is white on all branches, but grey and reticulated on the bole in unfavourable sites, the shady side of the tree, and in old or close-grown trees. Lack of care in the selection of cuttings results in a crooked form. The tree will grow on sites without accessible groundwater but prefers rich soils above moving groundwater, without special discrimination as to soil type. A tree will yield 2-3 cu.m. of timber at 25 years. It appears to be little subject to *Saperda* and *Cossus* attack and, except for a purely local instance in a 30- to 40-year stand on a dry site, it is also resistant to bacterial canker.

2728. PEKŠIBAĖ, M. I. Produktivnostj bere-skleta evropeiskogo v estestvennyh zarosljah. [Yield of *Euonymus europaeus* in natural thickets [in the steppes and mountains of the Northern Caucasus].] *Lesn. Hoz.* 5 (6), 1952 (75-7). [Russ.]

E. europaeus grown in the steppes and foothills of the Northern Caucasus grows faster (economic yield after 11-14 versus 14-24 years) and gives a far higher yield of air-dry root-bark (88 versus 10.3 g. at 10-12 years), than that grown in the mountains. This is ascribed to the greater fertility and depth of the soil, more sun and, in lesser degree, the longer growing season of the former region. Other advantages are the shorter rotations (10 versus 20 years) and possibilities of mechanized soil cultivation etc.

2729. KADAMBI, K. *Terminalia myriocarpa* Heurck and Muell. Arg. *Indian For.* 81 (1), 1955 (32-47 + 5 photos + 1 map + 1 drawing). 30 refs.

Botanical description, silvicultural characters and treatment, tending, increment, and wood properties.

2730. KADAMBI, K. The silviculture of *Holigarna arnottiana*, Hook. f. syn. *H. longifolia*, Wight et Arn. *Indian For.* 81 (2), 1955 (103-6). 22 refs.

Distribution, silvicultural characters, regeneration, increment, and utilization.

2731. KIENER, A. Note sur le Hintsy (*Intsia bijuga* O. Kze.). [A note on *I. bijuga*.] *Bois For. Trop.* No. 38, 1954 (36-42). [F.]

A note on the silvicultural characters of this species and its silviculture in Madagascar.

181.1. Distribution, Natural Range

See also No. 2794.

2732. HAYASHI, Y. [The natural distribution of important trees indigenous to Japan. Conifers, report 3.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 75, 1954. pp. 173 + 32 photos + 6 maps. 443 refs. [Jap.e.]

[Cf. *For. Abstr.* 14 (Nos. 3145-6).] Discusses, with distribution maps, the autecology, associates, regeneration, properties and uses of *Taxus cuspidata*, *Abies mayriana*, *A. sachalinensis*, *Picea glehnii*, *P. jezoensis*, *P. pentaphylla*, *P. himekomatsu* and *P. pumila*. The references are all Japanese except 26 English or German.

2733. The natural occurrence of the Eucalypts (One-page digests on individual species). *Leaflet. For. Timb. Bur. Aust.* No. 65, 1953. pp. 115.

The species (over 100) are arranged alphabetically under the specific name. Data given comprise synonyms, common names, bark type, size under typical conditions, forest type, geographical occurrence, climate, topography, soils and general information (growth, uses and timber, etc.).

181.2. Atmospheric Relations.

Acclimatization

See also Nos. 2665-7, 2690, 2741, 2775, 2782, 2849 et seq., 3090-1.

2734. DAY, W. R. The place of a species in the forest, with special reference to Western North American species of conifer used in Britain. *Forestry* 28 (1), 1955 (33-47). 7 refs.

The nature of the differences between the climates of the Queen Charlotte Islands and of England and Wales and discussed briefly. The author then examines the site tolerance of the principal species within their own natural range, comparing particularly the place of Sitka Spruce in the forest on Graham Island with its place round Terrace and describing the Douglas Fir forests of the drier eastern side of Vancouver Island and the place that Sitka has in them. Factors affecting the growth of Douglas Fir are discussed. Care is needed before it is assumed that a markedly dry summer period such as occurs in much of the Douglas Fir region entails a 'dry' period as regards supply to the tree. Illustrations are given from eastern North America of changes in type of site occupied by a species with change in climatic or edaphic environment. Observation of the relative position of a species in the forest as climate changes makes it possible to suggest the place of Sitka and Douglas in Great Britain. From author's summary.

2735. JACKSON, L. W. R., and HARPER, R. S. Relation of light intensity to basal area of Shortleaf Pine [*Pinus echinata*] stands in Georgia. *Ecology* 36 (1), 1955 (158-9). 5 refs.

An analysis of data from 31 plots showed strong correlation between average % of full sunlight at breast height and basal area. The following equation was derived: $\log y = 3.5177 + (-1.0586) \log x$.

2736. DANILOV, M. D. Sutočnaja periodičnostj v roste pobegov u nekotoryh drevesnyh i kustarnikovyh porod. [Day/night periodicity of shoot growth in some tree and shrub species.] *Dokl. Akad. Nauk SSSR* 96 (1), 1954 (205-8). 5 refs. [Russ.] [Povolžskij Lesotekhničeskij Institut im. M. Gor'kogo, Ioškar-Ola, Mari A.S.S.R.] A.P.B.

In 1944, from 21 May to 10 June, the author took measurements at 7 a.m. and 7 p.m. of the 3 strongest shoots per plant (mostly 5 or 15 years old) of various species grown at Ioshkar-Ola, Mari A.S.S.R. Mean values are tabulated for the period, showing daily, nightly and total 24 hours' growth, along with the mean ratios for daily/nightly growth. The species showing the highest values for this ratio (1.5-3.2) were *Robinia pseudoacacia* (coppice),

Quercus robur, *Fraxinus excelsior*, *Acer negundo*, and *Larix sibirica*. Species showing ratios of 1.3-1.5 were *Acer platanoides*, *Betula verrucosa*, *Caragana arborens*, *Sambucus nigra*, *Populus tremula* and *Picea abies*. A 5-year *Pinus sylvestris* showed a ratio of 0.9. In general it appears that the ratio is higher for species of southern origin, or whose present natural range is southern, than in those which range far into the north, an exception being *Larix sibirica*. On this limited material, there also appear to be differences with age, e.g. in *F. excelsior* and *A. negundo* the ratio fell, but in *B. verrucosa*, *A. platanoides*, *L. sibirica* and *C. arborens* showed a rise, with increasing age. In *F. excelsior* a 5-year plant under canopy showed a lower ratio than a similar plant without overhead cover.

2737. BRÜCKMANN, J. J. Observaciones sobre el ritmo vegetativo anual de algunos álamos en el Delta del Paraná. [The seasonal growth rhythm of Poplars in the Paraná Delta.] *Rev. argent. Agron.* 21 (4), 1954 (215-30). [Span.] E.M.B.

Attempts were made to pre-select on a basis of seasonal growth rhythm, clones of Black, Balsam and Black x Balsam hybrids most suitable to different climatic regions of Argentina, i.e. warm, warm-temperate, temperate, and cool. Measurements were taken on 49 trees at intervals throughout Oct.-March, in order to follow the progress of height growth. Most trees had two growth periods, one in spring and the other at the end of the dry season. Late-flushing individuals making little growth until mid-December are adapted to a short photoperiod, needing much warmth and a long growing season. Those making a greater % of growth during this period are more suitable to temperate or cool climates, being adapted to a longer photoperiod and a shorter growing season. Those most suited to a cool climate make their total growth before 1 December. For the Paraná Delta the most suitable clones are those utilizing both growing seasons and preferably flushing fairly late. Observations were also made on susceptibility to *Melampsora* sp. and *Septoria* sp. These are presented with a classification of the trees according to their suitability for different climates.

2738. OZOL, A. M. Napravlennaja perestroika i prisposoblenie drevnyh rastenij južnogo proishozhdenija pod vozdeistviju izmenennyh uslovij žizni. [Directed 'reconstruction' and adaptation of woody plants of southern origin under the influence of changed conditions of life.] In *Naučnaja Sessija po Voprosam Biologii i sel'skogo Hožajstva*, Riga, 22-26 Oktjabrja 1951 g. Akademiya Nauk SSSR, Moskva, 1953. pp. 198-216. 14 refs. [Russ.] H.S.B.

A conference paper reviewing, from the point of view of Mičurinist theory, some of the author's work [cf. also *For. Abstr.* 14 (Nos. 148, 3068); 15 (No. 2328)] on the acclimatization of *Juglans* spp. in the Moscow region, where trial plantations were made in 1940 of 6 species raised from seed from diverse regions of the U.S.S.R. The observations, made on the same plants in successive years, covered winter-hardiness as measured by degree of frost-killing of the shoots, the annual growth rhythm, and physiological condition of the tissues

especially in winter. Special attention is devoted to *J. regia*, the tenderest species, in which (1) plants of Black-Sea and N. Caucasian origin were regularly killed back to snow- or ground-level and so formed bushy growth from coppice, whereas (2) stock from the Ukrainian steppes, the Central Asian mountains and the E. Caucasus showed only limited killing back and grew into small trees 2-3.5 m. tall, many of which have flowered and borne seed. The higher degree of adaptation of (2) to the severe Moscow climate was evident also in their earlier start and earlier completion of annual shoot growth, with more gradual preparation ('ripening' of wood and formation of buds) for the winter, and in the physiological condition of the shoot tissues during the dormant season. It is noted that the hardest species at Moscow, *J. mandshurica* and *J. cinerea*, are poorly adapted to the growth conditions of southern regions, where they suffer frost damage; but a *J. cinerea* grafted on to coppice from an old root-stock of *J. regia* in S. Kirghizia is said to have proved frost-hardy and to fruit normally.

Notes are included [without details on genetic homogeneity or population involved] on experiments with several treatments that are said to have improved frost resistance in *J. regia*, viz.: (a) Exposure of seed, during the period of emergence and early growth of the radicle, to increasing daily periods at minus temperatures (C.) with simultaneous lowering of moisture to wilting point. (b) Exposure of germinating seed and young seedlings to alkaline conditions (pH 7-9), with the suggestion that the poor frost resistance found by some other workers may be associated with acid soils. (c) Cutting back to ca. ½ of the current year's shoots at a time (here the end of July or early Aug.) when the wounds heal well but no fresh shoots develop; by this means *J. regia* of Dzauzhikau, Dagestan and American provenance has been induced to form trees up to 3 m. tall in 9 years, and it is claimed that after some years the practice can be discontinued without serious frost damage occurring. (d) Pegging down the branches during early youth so that the trees have a procumbent habit.

2739. SEIFRIZ, W. The oecology of thicket formation. *Vegetatio* 4 (3), 1953 (155-64 + 18 plates). 26 refs. [E.] A.P.B.

Considerations are presented on the tundra of Russian Lapland, the *garigue* of Southern France, the *bois couchés* of the Swiss Alps, Rhododendron thickets bordering the Alpine fields of the Caucasus, the chaparral of south-western U.S.A., coppice growth on the shores of Cuba, the coastal Seagrape (*Coccoloba uvifera*) hedge fringing Caribbean countries, the *Clusia* thicket on Mt. Souffrier, Guadeloupe, and the plains of New Jersey. All these vegetation types have two features in common: (1) they consist mainly of drought-resistant species, and (2) they have a uniform top height. The only climatic factor common to all types, and which can be held responsible for these characteristics is a desiccating wind, such as the trade winds, the *mistral*, the *sirocco*, the *Föhn* and the chinook. Such winds cause high rates of evaporation and transpiration, and, in addition, prevent young shoots from rising

above the protective height of the thicket. Unlike desert, therefore, which is determined by availability of water, wind-pruned thicket is determined by excessive water loss due to desiccating winds.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 2596, 2600, 2605, 2612, 2615, 2620, 2646, 2659, 2665, 2677, 2690-1, 2725, 2728, 2738, 2775, 2823, 2951-2.

2740. KATO, R. [The effect of drying of soil on the water economy of Japanese Larch seedlings (preliminary).] *Spec. Rep. For. Exp. Sta., Hokkaido No. 2, 1954 (75-80)*. 10 refs. [Jap.e.]

Three-year-old seedlings were observed over a period of 18 days in a nursery where they were watered every evening and in pots in a glass-house where soil moisture was gradually reduced. Readings were made at noon when transpiration and osmotic pressure of the cell sap were at maximum. The hourly variation of light, relative humidity and temperature (air, surface soil and at 5 and 10 cm.) in one day are also graphed. Histograms with English captions show for both the nursery and potted plants the variation in: (a) soil moisture and, for the leaves, (b) osmotic pressure of cell sap, (c) water content, (d) transpiration, (e) cell-sap concentration. With decreasing (a), both (b) and (c) remained at first fairly stable but (d) fell away. While (a) was decreasing from 20 to 10% of field capacity, (b) rose from 15-20 to 32 atm. and (c) began to fall. For this species the results indicate a wilting point at an osmotic pressure of ca. 15-20 atm.

2741. JÁRÓ, Z. Az akác termőhelyi igénye. [The site requirements of *Robinia pseudoacacia*.] *Erdő 2 (4)*, 1953 (322-35, 390-1, 394-5). 17 refs. [Hu.russ.f.]

Summarizes the results of research on Robinia at the Scientific Forestry Institute. Flushing occurs on the average about 22 April (from 10 April in the south to 5 May in the north) and up to this date planting out is safe. If planting has to be done later, the plants should be kept in storage. The tree needs a growing season of 5-6 months, but, because of its susceptibility to early and late frosts, it should only be planted on the Alföld. On clay soils having a 'value of closeness' [Arany's measure of texture based on the plasticity limit] of up to 55, Robinia will thrive, if the soil has a stable crumb structure. On sandy soils, growth of Robinia is good at 'total hygroscopicities' of 70, moderate at 60-70, and poor at < 60. Soils with 'total hygroscopicities' < 40 are not suitable for afforestation. The 'total hygroscopicity' was obtained by multiplying Kuron's hygroscopicity value (hy = moisture % of soil in equilibrium with vapour pressure of 50% H₂SO₄ at room temperature) by the thickness of the soil layer concerned, and adding the values so obtained for each layer down to 2 m. in the profile.

2742. YOUNGBERG, C. T. Effect of soils on the establishment of tree crops. *Proc. Soil Sci. Soc. Amer.* 19 (1), 1955 (86-90). 50 refs. O.R.E.

A review of literature published in the U.S.A. and a discussion of present American research projects.

2743. UCHIDA, T., and YAMAMOTO, T. [Studies on suitable sites for Todo Fir in Hokkaido. IV. The soil of Todo Fir (*Abies mayriana*) in Tonbetsu.] *Spec. Rep. For. Exp. Sta., Hokkaido No. 2, 1954 (18-22)*. 2 refs. [Jap.e.]

The soil shows an A₁ horizon black and rich in humus; A₂ podzolized, greyish, sandy with small amounts of Fe₂O₃, SiO₂ and Al₂O₃, which are abundant in the reddish-brown B horizon in which the Fe₂O₃ accumulation is recognizable. B has a larger clay content than A₂ but exchangeable Ca is similar. Bases are probably eluviated from the A₂ to the B horizon and pH is greater in the latter. The soil is allotted to type P₂II for the national forest soil survey. *From authors' summary.*

2744. NAKATA, I. [Studies of proper sites for Todo Fir in Hokkaido. V. Comparison between the soil in [a 30-year-old] clear[ing] of secondary forest and in [a 33-year-old] planted forest of Todo Fir (*Abies mayriana*).] *Spec. Rep. For. Exp. Sta., Hokkaido No. 2, 1954 (23-7)*. [Jap.e.]

The profiles studied lie together on a B_C brown forest type. They have almost the same texture, but the plantation soil has a greater depth of humus and of soil to the C horizon, higher pH, C/N ratio, absorptive capacity, organic content, exchangeable Ca and H. Results are tabulated.

2745. UCHIDA, T., and YAMAMOTO, T. [Studies of proper sites for Todo Fir in Hokkaido. VI. The soils in different parts of the Kotanbetsu region.] *Spec. Rep. For. Exp. Sta., Hokkaido No. 2, 1954 (28-31)*. 1 ref. [Jap.e.]

Soils under Fir and Birch are compared for texture, structure and chemical composition. The topsoil under Birch had higher N content, pH, C/N ratio, absorptive capacity and exchangeable Ca. *From authors' summary.*

2746. RICHARD, F., and FEHR, R. Physikalische Bodeneigenschaften einiger Pappelstandorte im schweizerischen Mittelland. [The physical characteristics of the soils in some Poplar stands on the Swiss central plateau.] *Mitt. schweiz. Anst. forstl. Versuchsw.* 31 (1), 1954 (59-101). 13 refs. [G.g.f.]

Analyses density, pore volume, distribution of pore sizes, humus and C content.

2747. ORLOV, A. JA. Temperatura počv i proizvoditeljnostj lesov. [Soil temperature and forest site quality [in the eastern regions of the U.S.S.R.]] *Dokl. Akad. Nauk SSSR* 91 (4), 1953 (957-60). [Russ.] A.P.B.

Notwithstanding the hot summers, the temperature (t) of forest soils in many eastern parts of the U.S.S.R. is far lower, and the period when root growth is possible is much shorter, than in the central forest zone of Russia-in-Europe. The author presents some data collected during a tour of the chief forest types [localities not specified] in Aug.-Sept. 1951.

Productive Poplar/Spruce (site classes I-II) on relatively well drained valley drifts had t = 11-12°C. at 10 cm. depth, decreasing gradually to 5-7°C. in the 30-80 cm. layer. Similar results were obtained

for Poplar/Larch (I-Ia). In such types the bulk of the root systems occupy the top 40–50 cm. of soil, though some fine roots descend to 70–80 cm.

Mossy Larch (I-II) and Spruce (III-IV) forests occur on well drained, fairly steep (15–25°) slopes on stony podzolic clay-loams. Here t varies much with litter depth, but even with 30 cm. of litter ($t = 3^\circ$ under the litter; 2° at 40–60 cm. depth) a Larch stand was of site class II. In general, it seems that Larch and Spruce will grow satisfactorily with $t = 4-5^\circ$ in the upper and $2-3^\circ$ in the lower horizons.

Large areas on terraces, plateaux and very gradual slopes carry poor Larch (III-IV) with a ground cover of sphagna and other mosses. Where sphagna predominate there may be 50–60 cm. of peat. At the warmest season, permafrost occurs immediately under the peat, at 50–70 cm. depth, or in other soils (with 'green' mosses and 20–35 cm. of surface organic matter) at 15–20 cm. from the surface of the mineral soil. Most of the Larch roots are concentrated in the 5–20 cm. layer, though individual fine roots extend to 30–40 cm.; all end 10–30 cm. above the permafrost. For the zone of maximum rooting $t = 3-5^\circ$ (but in two cases, $1-5^\circ$ and 2°). The limiting factor in these forests appears to be lack of soil aeration rather than soil temperature.

Cold soils with permafrost at no great depth also occur on steep N. aspects with good drainage. In one such site, bearing Larch of site class IV, t under 30 cm. of litter was 4° , decreasing to 1° at 40 cm. from the litter surface and with permafrost at 48 cm. (among rock fragments). With similar slope and an equally stony soil, but on a S. aspect, where $t = 8^\circ$ at 20 cm., 5° at 80 cm., the Larch was of site class III.

2748. ZOLOTAREV, S. A. O vliyanii glavneishih hvoynih porod Dal'nego Vostoka na počvu. [The influence of the chief conifer species of the Far East upon the soil.] *Počvoved.* 1953 (2), (43–51). 15 refs. [Russ.] [Dal'nevostochnyi Nauchno-issled. Institut Lesnogo Khozjajstva, Habarovsk.] A.P.B.

The forests of the Soviet Far East fall into the main groups: (1) Ayan Spruce/Fir (*Picea jezoensis/Abies nephrolepis*); (2) Pine (*Pinus koraiensis*)/hardwoods; and (3) Dahurian Larch (*Larix dahurica*). Of these (1) and (2) are Tertiary relicts and (3) is Quaternary in origin. The sod and podzol processes of soil formation characterize (1), generally with gleying in the lower horizons of the profile. Leaf extracts of its two dominants have a pH of 3.5–3.6, and the litter is very acid. Both species are very shallow-rooting, and hence the circulation of compounds leached into the lower horizons is extremely limited. The upper horizons are generally moderately moist, the middle ones moist, and the lower water-saturated, air contents varying correspondingly. In contrast to these gleyed sod-podzols, the soils of (2) are podzolic brown mountain forest soils, despite the fact that they have developed in a closely similar though somewhat drier environment (at 200–650 m. alt., below the zone occupied by (1)). The root systems of the Pine and hardwoods are much deeper and are active in the recovery of leached materials from 50–100 cm.

depth. The upper horizons are moderately moist, and the lower, moist; their air content is higher than that of soils under (1). In many places where the dominants of (1) occur in mixture with (2), the former are gaining ground, and this process is accompanied by deterioration of soil conditions towards those under (1). This succession is ascribed partly to the direct action of the Spruce and Fir upon the soil, which discourages Pine regeneration, and partly to the shade and acid-soil tolerance of the invading species. There is also a more or less extensive admixture of Spruce and Fir in (3), and the boundaries of (3) and (1) are generally contiguous. The soils in (3) differ from those in (1) in humus and N contents, pH and base saturation, but especially in being still moister, with a higher water table, and often boggy. Their air content is also considerably lower. This poor air/water régime does not appear to be an effect of the Larch on the soil; on the contrary, the distribution of the Larch seems to be a result of its tolerance of such conditions, and it is considered to have gained ground from (1). Support is found for this conclusion in resemblances of soil morphology (especially in the lower horizons) and the chemistry of the mineral soil. Since the soils of (3) are less podzolized than those of (1), it is inferred that the Larch improves rather than degrades the soil. Tables give analytical data for soils in all 3 types and data on the air/water régime of soils in some types of group (2).

2749. REMEZOV, N. P. Vlijanie rubok uhoda na lesorastitel'nye svoistva počvy. [The influence of tending operations [cleanings or thinnings] on the soil properties concerned in forest growth.] *Počvoved.* 1953 (2), (32–42). 6 refs. [Russ.] A.P.B.

Previous work by the author and his collaborators in Scots Pine stands in a forest reserve (Mordovskii Zapovednik) [Vestnik Moskovskogo Universiteta 1949, No. 6] is quoted to show that the maximum uptake of N, CaO, K₂O and P₂O₅ per tree occurs at ca. 45–70 years of age, but since self-thinning is intense between 20 and 40 years (and then progressively decreases) the demand per ha. shows a maximum at this age, after which the uptake of these nutrients is roughly equal to the amounts returned to the soil by litter fall and dead trees.

The rest of the paper is devoted to tables and discussion of selected results [details incomplete and scale of studies not indicated] from research in 1939–41 on young, quality-class II, Scots Pine at: Pushkino, Moscow Province (17 or 24% of the volume cut in 1939); Orekhovo-Zuevo, Moscow Province (15 or 21% cut in 1934); and Kuznetsk, Penza (13, 26, or 38% cut in 1930). Subjects dealt with are changes in the ground flora; physical, chemical and biological soil properties; litter fall and litter composition. It is concluded that in general the tending operations caused changes as compared with controls, characteristic of the sod process of soil formation. Such changes, however, were slight, and the chief effect of the operations was to increase the rooting volume from which the residual trees could draw nutrients. An estimate is made of such increases in available nutrients per tree, showing a particularly noteworthy increase for

N, and a comparison made of the probable supply of and demand for nutrients by 10- to 20-year Pine, which indicates a N deficit at Kuznetsk and a bare sufficiency in the Pushkino soil. Thus the effect of tending operations on growth may depend largely on the supply of some particular nutrient or of water (since available water per tree is also increased). In the types studied there was apparently no reason to suppose that an increase in ground vegetation after cutting could endanger the nutrient supply of the trees.

2750. NICOLAS ISASA, A. Suelos españoles del pino carrasco (*Pinus halepensis* Mill). [Soils of *P. halepensis* in Spain.] [Bol.] Inst. for. Invest. Exp. Madrid 25 (70), 1954. pp. 319 + 8 plates. Many refs. [Span.span.f.e.g.]

A description of *P. halepensis* and its geographical distribution in Spain; details of soil samples taken from a large number of sites; results of analyses, both physical and chemical; and a statistical analysis of the data.

2751. ALBAREDA, J. M., MARTIN RETORTILLO, N., and CLAVER, M. Influencia de la vegetación en la composición del humus. Suelos bajo *Quercus ilex* y bajo *Pinus pinea*. El Pardo (Madrid). [Influence of vegetation on the composition of humus. Soils under *Q. ilex* and *P. pinea*. El Pardo (Madrid).] An. Edafol. Fisiol. veg. 13 (12), 1954 (859-64). 9 refs. [Span.span.g.] E.M.B.

Presents the results of a chemical analysis of litter and humus. Quantity of organic material is higher in litter and soils of Pine than in those of Oak. Total N, hydrolysable N and α -amino-N in % of organic matter is greater under Oak than under Pine. Quantity of humic acids extracted and their N is also greater under Oak than Pine.

2752. SAMCEVIČ, S. A., and KATERINIČ, T. D. Izmenenja organskogovno vešestva u južnom černoze pod vlijanjem dubovih nasađenih. [Changes in the organic matter in a southern chernozem under the influence of Oak plantations.] Počvoved. 1953 (4), (15-22). 13 refs. [Russ.] [Institut Lesovodstva AN USSR, Kiev.] A.P.B.

Presents the results of analyses made at various seasons in 1950-51 of a southern chernozem in the Nikolayev district, Ukraine, under Oak woods (up to 70 years old) and in clean-fallow steppe. The period since 1945, including the two years of the study, was a succession of drought years. Under these conditions the organic-matter content of the soil under Oak was found to be high, owing to the great limitation of downward water-percolation and the low moisture content. Except in the topmost 0-3 cm., the soil under Oak was considerably drier, especially in summer, than the fallowed steppe. The most striking difference, however, was the much higher content of water-soluble organic matter under the Oak; further, whereas the fallows showed no material seasonal variation, the soil under Oak displayed a maximum of such matter in the 'dormant' season (data given for February and November) and a minimum at leaf-flush (April). This phenomenon is discussed in connexion with the author's previous finding [Praci Institutu Lisivnictva AN URSSR 2, 1951] that under severe drought the

period of active root growth is displaced into the 'dormant' season (Nov.-March), when the soil is moister, and the maximum found in the present study is ascribed to the excretion (exosmosis) of water-soluble organic matter from the fine rootlets. The contents of such matter in soils with or without a cover of natural litter or Oak leaves, were determined in a field experiment in 22-year Oak on a dark-grey forest soil and a laboratory experiment on the southern chernozem. Results showed that leaching from litter had no great effect upon the contents of water-soluble organic matter in the soils. Field tests and pot trials also showed that the quantitative distribution of such matter in the soil corresponded to the distribution of the bulk of the fine roots of Oak. The content of water-soluble organic matter increased with increasing age of stand. Data are also presented to show that this matter decomposes more rapidly in the woodland than in the fallowed steppe soil; thus the combination of its high content, rapid turnover, and suitability as nutrient material for micro-organisms, must be an important factor in the high fertility of southern chernozem under Oak woods.

2753. BOBRICKAJA, M. A. Zoljnyj sostav listjev duba raznogo vozrasta v lesnyh polosah Kamennoj Step. [The leaf-ash composition of *Quercus robur* of different ages in shelterbelts on the Kamennaya Steppe.] Počvoved. 1953 (7), (17-24). 15 refs. [Russ.russ.] A.P.B.

Tabulates and discusses analyses of freshly fallen autumn leaves from Oaks 2-46 years old, with parallel data for the soil on which they were grown. The total crude leaf ash varied from 10-11% (based on dry weight) for 2- to 8-year trees, to 6.5-7.5% for trees over 20 years old. No important difference was found in ash composition between leaves from trees of different ages. Leaf contents of Ca and P were many times, and those of Mn, Mg, K and Na a few times, those of the same elements in the main rooting zone in the soil (20-40 cm.), but Si, Fe, and Al were much lower in the leaves than in the soil. CaO accounted for 48-66% of the pure leaf ash. Published figures from other parts of Russia show that the Ca and Mg contents of Oak leaves are much lower on podzols and on leached and podzolized chernozems, and much higher on a deep chernozem, than on the ordinary chernozem of the Kamennaya Steppe. The total leaf-ash contents for these other localities are given as ca. 6-8%.

2754. AIDINJAN, R. H. Zoljnyj obmen meždu drevesnoj rastitel'nostju i černozyemnymi počvami Kamennoj Step. [The ash-element exchange between woody vegetation and chernozem soils in the Kamennaya Steppe.] Počvoved. 1953 (9), (49-61). 20 refs. [Russ.] A.P.B.

Ash analyses of freshly fallen and 1-year-old litter, and electroanalysis of fresh litter, of Oak, Birch and *Acer platanoides* in shelterbelts, indicated the following order for rapidity of leaching from litter to soil: cations—K and Na > Mg > Ca and Mn > Fe and Al; anions—Cl > S > P > Si. Though rapidly leached from litter, K is partly

absorbed by the soil colloids and so becomes a lasting source of K for tree nutrition; more available K was found in soil under shelterbelts than in soil of the same type under steppe vegetation. Available phosphate, on the other hand, is rapidly taken up by vegetation, and no marked accumulation of it was found under either shelterbelts or steppe vegetation; neither were there marked differences in its content in different morphological horizons of the profile. A rough calculation of the nutrients returned to the soil surface in one year's leaf-litter alone, gave the following figures (in kg./ha.) for total pure ash, CaO, MgO, K₂O and P₂O₅, in that order: Oak—109, 55, 13, 9, 3; Birch—62, 28, 11, 10, 4; *A. platanoides*—233, 121, 25, 17, 5. Figures are also given for the other ash elements, and it is emphasized that the data must be taken to apply only to the soil and other factors of the habitat concerned. A comparison is made of ash-element contents in (1) fresh litter and (2) the corresponding contents in the soil colloids of the rooting zone. This shows Ca, P, Na, K, Mg and Mn contents several to many times higher, but Si, Fe and [except for Birch] Al contents much lower, in (1) than in (2) [cf. preceding abstract]. Some analytical data are also given for the older, deeper layers of Oak/Birch and Oak/Maple litter. These include figures for the residue insoluble in 5% solutions of HCl and KOH, as a % of the crude ash, and attributable to the presence of soil particles. In view of the difficulty of obtaining 'pure' litter samples, the author especially stresses the need for indicating this residue in litter studies. The data for the individual elements, compared with those obtained from freshly fallen leaves, show that, as a result of the differing rates of removal, the older litter is enriched in some (Si, Al, Fe) and impoverished in others (K, Mg, P, Ca) to varying degrees. A rough estimate is given of the total contents (in kg./ha.) of minerals in the litter under Oak/Birch and Oak/Maple. In view of the high nutrient content and rapid decomposition of its litter, the Maple is particularly recommended for this region. Analytical data are also presented for the soil colloids (fraction $< 0.2 \mu$) of the ordinary chernozem of the Kamennaya Steppe under shelterbelts, a ley rotation, and mown and unmown steppe, to show that no significant podzolization can be detected under the now > 50 -year-old shelterbelts.

2755. REMEZOV, N. P., and BYKOVA, L. N. Potreblenie i krugovorot azota i zolnykh elementov v osinnikah. [Uptake and cycle of N and ash elements in Aspen stands.] *Počvoved.* 1953 (8), (28-41). 2 refs. [Russ.] A.P.B.

Discusses and gives in 19 tables the results of studies made in 1949-51 on 3 plots in Aspen (*Carex pilosa*/Aegopodium podagraria type) with some admixture of other deciduous species, in the Voronezh forest reserve, on sandy grey-brown forest soils of the same type, having similar morphology, mechanical and chemical composition (considerable humus content, high base saturation, feebly acid reaction; available K and P low): (1) 10 years old, with Hazel etc. and little ground vegetation; (2) 25

years old, with understorey chiefly of Lime, Hazel etc. in the shrub layer, and much ground vegetation; and (3) 50 years old, with Lime/Norway-Maple understorey, and much ground vegetation except where the woody undergrowth was too dense. In the two latter, there were also many tree seedlings. The weights [all weights quoted are oven-dry] are given of foliage, small and large branches, stem, stump, and large and fine roots per Aspen tree [population not stated], with corresponding figures per ha. Total weight/tree increased from ca. 2 kg. for (1) to 388 for (3). Annual litter fall of all species varied from 3850 kg./ha. for (1) to 4880 for (3), Aspen leaves making up 55-72% of the total. The rest of the paper gives results for Aspen alone. For this, calculations based on figures for self-thinning indicate approximate weights (metric tons/ha.), for (1)-(3) respectively, as follows: live trees 16.5, 187, 251; c.a.i. 8.2, 20.0, 14.3; litter + dead trees 4.8, 11.9, 24.3. Analyses of the N and ash elements in the same parts of the trees show that the % contents decrease in the order: leaves $>$ fine branches $>$ large branches $>$ stem (those of large and fine roots corresponded roughly to those of large and fine branches). The chief constituents decreased in the order: CaO $>$ N $>$ K₂O $>$ P₂O₅, except for leaves, where N $>$ CaO. K and Si contents were also higher in leaves than in the other parts. A dead stem showed practically the same N and ash-element contents as living ones. There was no consistent trend with age in contents of the elements determined, except for a tendency of total ash and Ca to decrease in the stem, and of Ca, Mg and Si to increase in the leaves. Supplementary data for the herbaceous cover showed higher %s for total ash, K, Ca, Si and P, but lower N, than in Aspen leaves. The absolute contents of N and ash constituents per tree are also calculated (totals, and for the same parts). Analyses of dry, fallen leaves showed lower %s of N, P₂O₅ and SO₃, and higher Al₂O₃, CaO and (except for 10-year trees) SiO₂, than green leaves on the tree. It is calculated that the annual fall of leaves and branches contains CaO 107-141, K₂O 68-97, N 42-53, SiO₂ 57-71, MgO 14-16, P₂O₅ 10-11, SO₃ 8-12, Al₂O₃ 9-14, Fe₂O₃ 1-2, and MnO 0.4-1.1 kg./ha., according to age. Using supplementary data for a 30-year Aspen stand, the variation with age in annual requirement per tree of these materials is calculated, and it is noted that Aspen's requirements considerably exceed those of e.g. Lime and Oak. On the basis of these data, an estimate is made of the amounts per ha. taken up, retained by the trees and returned in litter and dead trees. The figures show a continuous increase in demand for N, Ca, K and P up to 50 years (in contrast to previous findings for Oak in Voronezh, which showed a maximum demand at ca. 25 years). The N, Ca, K and SiO₂ accruing to the soil from litter considerably exceed the amounts from dead trees. The total amounts taken up and returned at 50 years of age are given, respectively, as CaO 387, 246; N 174, 120; K₂O 159, 133; P₂O₅ 45, 30; SO₃ 36, 26; MgO 33, 25; SiO₂ 76, 68; Al₂O₃ + Fe₂O₃ 22, 17 (all in kg./ha.). The high uptake and low retention of SiO₂ is especially noteworthy: the fate of the high

SiO_2 in litter may be expected to depend largely on the pH of the soil, i.e. in acid soils the low solubility of SiO_2 may result in its accumulation at the surface.

Some calculations are also given of the absolute contents in kg./ha. of N and ash constituents in the aerial parts of the subordinate herbaceous vegetation in (1)–(3), with the conclusion that even at its maximum development this vegetation has relatively little influence upon the nutrient cycle of Aspen stands. An estimate is finally made of the probable effects on the nutrient cycle of felling 25% [by volume?] at 10 or 25 years.

2756. WALKER, L. C. **White Birch helps restore potash-deficient forest soils. Better Crops with Plant Food**, Washington 37 (10), 1953 (11–2, 49). 6 refs. H.S.B.

Among plantations on abandoned farm land in the Adirondacks, showing signs of K deficiency, it was observed that young *Pinus strobus* were thriving under the crowns of *Betula papyrifera*. Chemical analyses of the soil showed that, in the old ploughed layers, amounts of exchangeable K and acid-soluble P were much greater under the Birch/Pine groups than in the open, and total N and pH were slightly higher than in the open. Below this horizon, soils did not differ appreciably: with increasing depth a rapid decrease in exchangeable K was found. Foliar analyses confirmed that the Birch makes K (probably from the lower soil horizons) available to the understorey Pines.

2757. KAWADA, H., and TAKAMI, M. [Studies on the chemical properties and humus forms of the deciduous forest soils in Oneyama national forest.] *J. Jap. For. Soc.* 36 (11), 1954 (331–5). 9 refs. [Jap.e.]

A local study in (a) pure *Zelkova serrata* (47 years) and (b) mixed *Castanea crenata* (47 years) and *Quercus serrata* on coarse volcanic ash ca. 170 years old from Mt. Asama, at 640 m. alt. Data are tabulated, with English captions.

2758. **Soil analysis [effect of Wattle growing]. Rep. Wattle Res. Inst. S. Afr. 1953/54, 1954 (20–1).**

A comparison of the pH and % water-stable crumbs 0.5 mm. diam. in soils from a Wattle plantation unburned for 60 years, and an annually cultivated firebreak and natural veld, both near by, confirms other work showing that acidity increases under Wattles and that grass maintains structure better; Wattle litter however reduces evaporation and compaction by rain and assists infiltration.

2759. DOMINIK, T., NESPIAK, A., and PACHLEWSKI, R. **Badanie mykotrofizmu zespołów roślinnych regla górnego w Tatrach. [Mycotrophy in the plant associations of the highest Spruce forests of the Tatra range.] Acta Soc. Bot. Polon.** 23 (3), 1954 (487–504). 6 refs. [Pol.g.] O.B.D.

Presents the results of investigations into the mycotrophy of the following associations: *Piceetum excelsae normale* on limestone soils, and *Piceetum excelsae myrtiletosum* on granite soils. About 75% of the species proved to be mycotrophic, mycotrophy decreasing with increasing density of stand. With increasing illumination in the more open stands of the higher sites mycotrophy may reach 100%. The

mycorrhiza most commonly found on Spruce was the ectotrophic mycorrhiza of type A.

2760. MELIN, E., and DAS, V. S. R. **Influence of root-metabolites on the growth of tree mycorrhizal fungi. Physiol. Plant., Copenhagen** 7 (4), 1954 (851–8). 11 refs. [E.e.]

[Cf. *For. Abstr.* 16 (No. 71).] The action of excised roots on the growth of tree mycorrhizal fungi has been studied. Roots of *Lepidium sativum*, *Medicago sativa*, *Cannabis sativa*, and *Triticum aestivum* all produced metabolites which increased the growth rate of *Boletus variegatus* and *B. elegans* in a nutrient medium containing sugar, salts, B-vitamins and amino acids. Pea roots initially had a growth-promoting influence on *Rhizopogon roseolus* but after some time they caused a strong growth-inhibiting effect on this fungus. The experiments seem to show that the growth-promoting root metabolites concerned, conveniently called factor M, are not specific for certain roots, but occur in a great number of plants little related to each other. The magnitude of the growth-promoting root effect is very different for different tree mycorrhizal fungi. The results indicate that *Boletus variegatus* and *Rhizopogon roseolus* are only partially deficient for the M-factor whereas *Russula xerampelina* may be totally deficient or nearly so. *From authors' summary.*

2761. STONE, E. L., and MCAULIFFE, C. **On the sources of soil phosphorus absorbed by mycorrhizal Pines. Science** 120 (3127), 1954 (946–8). 15 refs. O.R.S.

Phosphorus as $\text{KH}_2\text{P}^{32}\text{O}_4$ was added at rates of 10 and 100 lb./acre to two prairie soils (a Carrington silt loam and an O'Neill sandy loam) naturally lacking mycorrhizal fungi. Seedlings of *Pinus radiata* grown for 7 weeks in 0.1 Hoagland solution lacking P were transplanted into containers of the soils. Segments of mycorrhizal Pine roots were used as inoculum. A week later, Italian rye grass was sown in containers with or without Pines. The grass and half the Pines were harvested after 28 days and the other Pines after 64 days. The tops were analysed for total and radioactive P. Response of the inoculated seedlings was slow and irregular, but all seedlings with appreciable increase in dry weight or P content were mycorrhizal and no non-mycorrhizal controls responded, while inoculated seedlings with few or recently formed mycorrhizae at harvest showed little or no response. Although dry weight of tops of non-mycorrhizal and non-responding seedlings increased slightly, P content decreased, presumably because of transfer to the roots; despite this reduction, 4.0 and 11.3% of the P in tops from Carrington and O'Neill soils respectively, treated at the 100-lb. rate, was derived from the added P. The increased total P associated with mycorrhizal formation is linearly related to the uptake of P from the inorganic addition; the relationship is affected by soil and rate of addition but not by duration or extent of mycorrhizal activity. Italian rye grass and mycorrhizal Pine seedlings used both the inorganic P and that from the original soil to a very similar degree. [Cf. *For. Abstr.* 13 (No. 1943).]

2762. BOND, G., FLETCHER, W. W., and FERGUSON, T. P. The development and function of the root nodules of *Alnus*, *Myrica* and *Hippophaë*. *Plant & Soil* 5 (4), 1954 (309-23). 13 refs.

[Cf. *For. Abstr.* 16 (No. 230).] In function and development the nodules in *Alnus glutinosa*, *Myrica gale* and *Hippophaë rhamnoides* closely resemble those of legumes. Nodulated plants of these species fix atmospheric N, and the seat of this fixation is shown by isotopic-N and other tests to be in the nodules. This fixation can support healthy growth in the absence of combined N from the root media, a fact which gives these three species special ecological importance. As judged by infective power, the acid tolerances of the endophytes of these three species differ markedly, indicating different identities. The optimum pH for the subsequent growth of nodulated *Alnus* is distinctly lower than that for nodule initiation, indicating adaptation on the part of the endophytes to the habitat conditions of the host. The addition of $\text{NH}_4\text{-N}$ to culture solutions results in increases in plant and nodule weight but the proportion of the latter falls away as N is increased. *Alnus* and *Myrica* are much less sensitive in this respect than *Hippophaë*.

2763. VIRTANEN, A. I., MOISIO, T., ALLISON, R. M., and BURRIS, R. H. Fixation of molecular nitrogen by excised nodules of Alder. *Acta chem. Scand.* 8 (9), 1954 (1730-1). 5 refs. [E.] [Biochemical Institute, Helsinki.] O.R.S.

Excised nodules of *Alnus glutinosa* were shown by N^{15} tracers to fix N, but factors influencing the fixation are not sufficiently under control to ensure uniform results.

2764. QUISPEL, A. Symbiotic nitrogen-fixation in non-leguminous plants. I; II. *Acta bot. neerland.* 3 (4), 1954 (495-532). 39 refs. [E.] O.B.D.

I. In preliminary experiments it proved impossible to cultivate the endophyte from root nodules of Alder on the usual media *in vitro*. Reasons for difficulties connected with its isolation are examined and discussed. Nodules which have remained visibly sterile after 6 weeks on a good nutrient medium, contain the endophyte still in its vital virulent and efficient form. Such nodules are very suitable as inoculation matter for work under sterile conditions, and with the aid of such nodules elementary N fixation was confirmed under pure conditions.

II. The results of the experiments reported support the theory that infection occurs through a chance contact of the endophyte with a limited number of pre-formed foci. The influence of external factors seems to be mainly the same as observed in leguminous plants. The formation of nodules is inhibited by nitrates and NH_4 salts and by the presence of sugars in the nutrient solution. Good light conditions are necessary, and light intensity may influence the number of foci. *From author's summaries.*

2765. SCHULTZ, A. M., and BISWELL, H. H. A method for photographing roots. *J. For.* 53 (2), 1955 (138). 1 ref.

The natural position of the root system is displayed

on one side of the plant by removing soil. The exposed roots are then sprayed with aluminium paint or yellow enamel which is removed from the soil face by exposing a fresh surface, thus providing a contrasting background.

2766. REDMOND, D. R. Variations in development of Yellow Birch roots in two soil types. *For. Chron.* 30 (4), 1954 (401-6). 6 refs.

Under the conditions of the experiment [pot cultures of seedlings] Yellow Birch rootlets made their optimum development in loam. If a portion of a root system occupied loam and the remainder sand, the former branched and elongated rapidly, whereas the latter remained undeveloped. Higher nutrient content of the loam is considered to be the dominant factor. *From author's summary.*

2767. KALELA, E. K. Mäntysiemenpuiden ja -puustojen juurisuhteista. [The root relations of Pine seed trees and the young stand.] *Acta for. fenn.* 61 (28), 1954. pp. 17. [Fig.]

It has been shown that the root system of Pine seed-trees spreads equally in all directions round the tree, but that near the root collar, where the network is thickest, it is markedly excentric. This phenomenon must date back to the early stage of the stand, when fierce competition between the trees causes such abnormality. Later, when the stronger trees have enlarged their growing space at the expense of others, their root systems can spread evenly round the tree. Measurements of the root systems of a number of trees on different soils and at different distances from the tree showed that, on an average, the zone of full development extended to a radius of 2 m. and then thinned out. Other investigators have shown that root competition from the parent tree affects the development of seedlings to a distance of 3.5-5.0 m. From these two sets of data it is estimated that the root-density of the seed-tree critical for the seedlings is ca. 200 m. total length of roots/sq. m. (65-70 m./sq. m. in humus). A set of diagrams is presented showing the effective growing space available to seedlings according to the relative spacing of the seed trees.

2768. DOWELL, M. H. D. A note on the regeneration of Beech at Burnham Beeches. *J. Oxf. Univ. For. Soc. (Ser. 4)* No. 3, 1954 (26-8).

A study of a small area of Beech seedlings some 2-3 years old showed a tendency for mortality to be less in plots freed from root competition by 'trenching' round the outside of the quadrat, thus severing roots of overstorey trees to a depth of 1 ft. Seedlings were most abundant in the looser soil round trees and old tree stumps, and larger and more vigorous round tree stumps than round the growing trees.

2769. LEYTON, L. The influence of artificial shading of the ground vegetation on the nutrition and growth of Sitka Spruce (*Picea sitchensis* Carr.) in a heathland plantation. *Forestry* 28 (1), 1955 (1-6 + 1 plate). 4 refs.

A marked stimulus had been obtained by shading the heather vegetation surrounding the trees by means of wooden laths. The increased growth was accompanied by significant increases in the concentration of N, ash, and Mn in the needles, indicating a substantial increase in the availability

of these nutrients to the trees. A similar shading experiment on plots from which the heather (*Calluna vulgaris*) had been previously removed by screening, produced only doubtful responses. Heather plants growing beneath the laths were found to contain appreciably lower concentrations of nutrients in the foliage than unshaded plants. Whilst the response of the trees to shading of the ground vegetation is to be attributed largely to reduced competition by the heather for available nutrients in the soil, especially N, the mulching effect of the heather in maintaining satisfactory moisture conditions during dry periods must also be taken into account. These findings offer an explanation for the improvement in the growth of Spruce in mixture with nurse trees when the latter form a closed canopy and suppress the ground vegetation. *Author's summary.*

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 2767-9, 2913, 2951.

2770. FILHO, O. A. GURGEL. Competição de métodos de cultivo no desenvolvimento da espécie florestal 'mata fome' *Hovenia dulcis*, Thunb. [Methods of cultivation and growth of *H. dulcis*.] *Rev. Agric., Piracicaba* 29 (10/12), 1954 (327-32). 6 refs. [Port.port.e.] A.P.B.

Trials were made at the Santa Rita do Passa Quatro Experimental Nursery in growing *H. dulcis* with and without competition from grass (*Paspalum notatum*). Seedlings averaging 0.3 m. in height were planted in 1952 at 2.5 × 2 m. spacing in 2 series: (1) on ground which had been covered with *P. notatum* for several years; the grass was retained on this site for 1 year after planting; (2) on ground cleared, and kept clear of grass. Measurements made in 1953 showed a mean height of 1.05 m. in the grassed plots, and of 2.61 m. in the cleared plots. A statistical analysis of height and diameter growth made in 1954 confirmed the superiority of the cleared plots.

181.5. Reproductive Behaviour

See also Nos. 2767-8, 2834 *et seq.*

2771. ROHMEDE, E. Umwelt und Erbanlagen bei der Fichtensamenausbeute. [Environment and heredity in Spruce seed yield.] *Z. Forstgenet.* 3 (6), 1954 (113-8). 9 refs. [G.g.e.f.]

Records of seed yield (i.e. weight of sound seed/50 kg. air-dry cones) for the years 1935, 1936, 1938 and 1942 were kept for 60 Spruces (58 years old in 1935) from Kraft crown classes 1 (22 trees), 2 (21 trees) and 3 (17 trees) in Bavaria. The figures, presented in tables and graphs, show no consistency as between crown classes, i.e. the yield as a whole from class 1 is not greater than that from class 3, but there are considerable fluctuations from tree to tree and from year to year. Figures for highest and lowest yields vary from 44 to 3613 g. Environmental differences affecting these variations are climate, elevation and latitude, added to the quantity of pollen available during flowering. Hereditary factors include seed yield from the average-sized cone, 1000-seed weight and capacity for fertilization, though these characters are also influenced by

environmental factors. That the influence of external factors is very great can be seen in the wide variations in seed yield from the same tree in different years; nevertheless, inherited characteristics, particularly the capacity for fertilization, are of sufficient importance to warrant the selection of good seed-yielding trees for breeding. *From author's summary.*

2772. VIĆENTIĆ, M. A. O nekim osobenostima fruktifikacija *Pinus nigra* Arn. [Some features of the fruiting of *P. nigra*.] *Šumarstvo* 7 (9/10), 1954 (522-36). 11 refs. [Serb.serb.e.g.]

Cones were collected from stands and isolated trees ca. 60-70 and 100 years old, with mean d.b.h. 29 and 45 cm. and mean heights 15 and 20 m., respectively; the soil mostly overlay serpentine and peridot. Tables give for 8 sites the results of determinations of the length, width, weight, moisture content, and number of scales in the cones; effect of cone length and width on the number of seeds; dimensions and weights of seeds, and their germinative capacity and energy. An abridged table with length and width data for cones has English captions.

2773. MCVEAN, D. N. Ecology of *Alnus glutinosa* (L.) Gaertn. I. Fruit formation. II. Seed distribution and germination. *J. Ecol.* 43 (1), 1955 (46-71). 27 refs.

I. The extent to which fruiting periodicity occurs in the Alder is described. Dates are given for the stages of fruit development, and the vulnerability of the ♂ nuclei in the extended period of 4-5 months between pollination and fertilization is stressed. Empty seeds are the result of fertilization failure rather than abortion. East Anglian Alders are shown to be completely self-sterile, and this, rather than frost damage to flowers, is regarded as a possible reason for low seed viability in certain years. High winds at the time of flowering are the most likely cause of low fertility in exposed populations and of the decreased % of embryo formation with increased altitude. Even in good seed years, embryos are not formed at altitudes above 300 m.

II. Running water and wind-drift over standing water are shown to be the chief agents of dispersal, with important effects on seedling establishment and the form of populations. There is considerable variation (0-80%) in the viability of the seed set, and low viability is almost wholly due to the failure of embryo formation. Optimum germination takes place at about 26°C. and is independent of light, normal temperature fluctuations, and pH of the substrate. High O tension and humidity in the surrounding air are necessary for satisfactory germination. Cold treatment of damp seeds at 0-4°C. for at least 6 weeks reduces the minimum germination temperature from 18 to 7°C.; this has important ecological implications. The course of germination is described for laboratory and field seedlings. An important feature is the relative weakness of radicle elongation and the liability of the radicle to suffer damage by low temperatures and incipient drying in the early stages of germination. This partly explains the

hydrophytic behaviour of the species. *From author's summaries.*

2774. ŠČEPOTJEV, F. L. O raznokačestvenosti cvetkov v krone greckogo oreha (*Juglans regia* L.). [Qualitative difference between flowers in [different parts of] the crown of *J. regia*.] *Dokl. Akad. Nauk SSSR* 96 (1), 1954 (197-200). 5 refs. [Russ.] A.P.B.

Studies in 1950-51 at an arboretum in the Kirovograd region, Ukraine, showed that in *J. regia* the flowers (both ♂ and ♀) at the distal ends of the branches were earlier and larger than those in the interior of the crown, the flowering time differing by as much as 4-10 days. Flushing also began at the periphery of the crown and proceeded inwards. Fruits from the peripheral flowers were larger, differed in shape and oil content at maturity, and are said to have produced more vigorous progeny, than those from inside the crown. The differences are ascribed to more favourable nutrient supply, microclimate and opportunities for pollination, especially cross-pollination, in the peripheral parts of the crown.

2775. TARRANT, R. F. Soil reaction and germination of Douglas Fir seed. *Res. Note Pacif. Northwest. For. Range Exp. Sta.* No. 105, 1954. pp. 4. 5 refs.

Three independent tests using as germinating media (1) soils that had been subjected to high temperatures, (2) mixtures of wood ash and sand and (3) soils from slash-burned areas, showed no relation between soil pH and germination. Seedlings in media with higher pH suffered heavy damping-off losses a day or two after emergence.

2776. THOMAS, J., and PLATT, R. B. Maximum temperature tolerances of Loblolly Pine and Sweetgum seedlings under varying soil moisture and light conditions. *Journal of the Tennessee Academy of Science*, Nashville 29, 1954 (186). Title in *Bibliogr. Agric. U.S. Dep. Agric.* 18 (11), 1954 (92335).

2777. RUDOLF, P. O. Age of seed tree and earliness of shoot growth in young Red Pine seedlings. *Tech. Note Lake St. For. Exp. Sta.* No. 422, 1954. pp. 1.

Observations on nursery seedbeds in the Chipewewa National Forest, N. Minnesota, showed that progeny from very young (under 30) and very old trees (over 120 years) are slower in starting main shoot growth in the spring than those from trees of intermediate ages.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 2620, 2659, 2736, 2739, 2755, 2823.

2778. SCHÖFF, J. Untersuchungen über Astbildung und Astreinigung der Selber Kiefer. [The formation of branches and natural pruning in Scots Pine in the Selb forest district.] *Forstwiss. Cbl.* 73 (9/10), 1954 (275-90). 26 refs. [G.]

Presents the results of investigations into various characteristics of branchy and non-branchy forms of Pine in this district, discusses the parts played by genetic and environmental influences in determin-

ing these forms, and draws some conclusions about stand tending.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour
See also No. 2777.

2779. HUMMEL, F. C., and LEWIS, R. E. A. The Closewalks Yews, Cowdray Estate, Midhurst, Sussex. *Quart. J. For.* 49 (1), 1955 (35-7 + 2 plates).

A temporary sample plot of 0.395 acres was measured in the centre of the Yew stand (age ca. 300 years). The results of measurements on 51 trees gave the following results: 129 stems/acre, b.a./acre 232 sq. ft., mean height 81 ft., mean quarter-girth b.h. $1\frac{1}{2}$ in., volume o.b./acre 5500 Hoppus ft.

181.8. Phenology

See also Nos. 2648-9, 2679, 2690-1, 2737, 2774, 3355.

2780. TIURIN, A. V. Sezonnoe razvitiye duba v evropejskoj časti SSSR. [Seasonal development of Oak in the European part of the U.S.S.R.] *Lesn. Hoz.* 5 (7), 1952 (44-7). [Russ.]

Presents (in a table and maps) phenological data for the early-flushing form of *Quercus robur* in 8 localities (ranging from Belorussia to Kazan, Bashkir, Krasnodar and the Ukraine), covering swelling of buds, opening of buds, first appearance of foliage, and of flower, first yellowing of foliage, complete yellowing of foliage, and end of leaf fall, in the years 1948-51. Dates for the spring development of the late-flushing form may be taken as about 3 weeks later; the autumn dates are the same for both forms.

2781. TUCOVIĆ, A. Prilog poznavanju crnih topola u Beogradu i okolini. [*Populus nigra* in Belgrade and its vicinity.] *Šumarstvo* 7 (11/12), 1954 (638-49). 14 refs. [Serb.e.g.]

Some tabulated phenological data (flowering, flushing, leaf-fall, and fruiting) are given for the local *Populus nigra*, *P. nigra* var. *italica*, the same with ♀ catkins, *P. nigra* var. *betulifolia*, and *P. nigra* var. *plantiensis*.

2782. ŻELAWSKI, W. Czynniki termiczny i świetlny w okresie się pączków drzew na wiosnę. [The heat and light factor in the flushing of trees.] *Sylvan* 98 (6), 1954 (483-6). 16 refs. [Pol.]

Simple orientation experiments were made in order to discover whether the known stimulating effect of illumination (daylight, electric light) on the opening of buds can be at least partly explained by the thermal effect always accompanying it. Larch, Beech and Oak cuttings were placed in vessels with tapwater, some of them hooded in black paper, others in tracing cloth, still others left uncovered. One-half (a) of the vessels were exposed to the natural sequence of day and night (in March), the other half (b) were continuously illuminated by 500-watt lamps; the air temperature of (a) was ca. 21° C., of (b), owing to the proximity of the hot bulb, ca. 23°. No dependence of the date of bud opening on illumination could be found for Larch and Oak cuttings, merely a dependence on temperature; for

Beech, in accordance with published experience the buds remained dormant in all cases. In another series of experiments, Silver Fir behaved like Larch and Oak.

2783. SUSMEL, L. Indagini sulla differenziazione del ritmo dell'attività vegetativa in provenienze di *Abies alba* Mill. [Differences in the rhythm of vegetative activity in *A. alba* of different provenances.] *Ital. for. mont.* 9 (6), 1954 (289–302). 44 refs. [It. it. f.]

Silver Fir from (a) Calabria, (b) the Tyrol, grown at Vallombrosa, showed striking differences in growing period, which was 30 days longer in (a) than in (b), though both needed a mean temperature of 8–9° C. for 15–25 days before growth began.

2784. CIAMPI, C. Ritmo di accrescimento del legno e caratteristiche anatomiche in individui di abete bianco (*Abies alba* Mill.) di diversa provenienza. [The growth cycle and anatomical characters of wood of *A. alba* of different provenances.] Bruno Coppini & C., Firenze. 1954. pp. 8 + 13 photos. 8 refs. [It. it. f.]

A study was made of Silver Firs grown at Vallombrosa, but of different provenances—(a) Calabria and (b) the Tyrolean Alps. Cambial activity began on the same date and proceeded at the same pace, but continued longer in (a) (mid-Oct.) than in (b) (mid-Sept.), a difference reflected in the anatomical features of the bark as well as the width of growth ring.

2785. EGGLE, W. A. Radial growth in nine species of trees in Southern Louisiana. *Ecology* 36 (1), 1955 (130–6). 9 refs.

Measurements of radial increment of 70 trees in 9 species, were made by dial-gauge dendrometer at frequent intervals over a period of one year. *Populus deltoides* grew most with a radial increment of 0.315 in., and *Acer rubrum* var. *tridens* least, with 0.024 in. *Quercus virginiana* began growth earliest, in February. A majority of all trees began growth in March and April, but a few individuals did not begin until June. *Taxodium distichum* was the first to cease growth, some individuals stopping as early as 1 June; one *Platanus occidentalis* and several *Nyssa aquatica* grew until early November. Individuals of a species usually ceased growth at different times, but the 10 *Celtis laevigata* investigated all stopped at the same time. The length of the growing period, the period of maximum growth, and the date of half-growth are given for each species. Leaf development is correlated with initiation of cambial activity. Most trees began growth before the leaves were fully mature. It is believed that low temperatures limit initiation of growth of trees which start in February and March. Most trees cease growth in summer while temperatures are still high. There appears to be no shortage of water, and it is suggested that continuous high summer temperatures, or possibly photoperiodic influence may play a part in causing cessation of growth. *From author's summary.*

2786. FAHN, A. Annual wood ring development in maquis trees of Israel. *Repr. from Palest. J. Bot. (J. Ser.)* 6, [1952?] (1–26 + 2 plates). 19 refs. X.

Cf. *For. Abstr.* 14 (No. 2037).

182. *Synecology, Plant Sociology: General, Principles and Methods*

See also No. 2582.

182.1. Palaeoecology. History of Vegetation

See also Nos. 2794, 2812.

2787. MIRIMANJAN, H. P. Problema lesa i stepi v uslovijah Armenii. [The problem of forest and steppe in Armenia.] *Počvoved.* 1953 (9), (62–7). 11 refs. [Russ.] A.P.B.

A review of literature in support of the view that the greater part of Armenia bore forest not only in prehistoric but also in historic times. The disappearance of the forest is attributed in the first place to agricultural and pastoral husbandry.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 2748, 2800, 2811–2, 2814, 2820, 2829, 2839, 2981, 3001.

2788. CAMPBELL, R. S. Vegetational changes and management in the cutover Longleaf Pine-Slash Pine area of the Gulf Coast. *Ecology* 36 (1), 1955 (29–34). 22 refs.

Succession in the Longleaf/Slash Pine belt is influenced by timber cutting, burning, and grazing. The damaging effects of wildfire and uncontrolled annual burning can be alleviated in managed stands by prescribed burning. Pigs and sheep are both serious enemies to Pine regeneration, but cattle are usually harmless. Research is needed on the treatment of scrub hardwoods that develop after felling Pine or when complete fire exclusion is practised.

2789. WYATT-SMITH, J. Changes in composition in early natural plant succession. *Malay. Forester* 18 (1), 1955 (44–9). 1 ref. (4th World Forestry Congress, Dehra Dun, 1954.)

The preliminary report on this study of succession on an area of second-growth forest appeared in 1949 [see *For. Abstr.* 11 (No. 2252)]. The principal change since 1950 has been the rise in *Macaranga gigantea*, which has formed an almost complete canopy 30–40 ft. high, with an understorey of other woody species. There has been a great reduction in ferns and herbs, especially *Mikania scandens*.

182.3. Units of Vegetation (Associations etc.)

See also No. 2811.

2790. POORE, M. E. D. The use of phytosociological methods in ecological investigations. I. The Braun-Blanquet system. II. Practical issues involved in an attempt to apply the Braun-Blanquet system. *J. Ecol.* 43 (1), 1955 (226–69). 60 refs.

The combination of the methods of various schools adopted by the author results from an attempt to rationalize and examine critically the technique of his Braun-Blanquet school. The application of his system will be expounded in further articles.

182.4. Layer Communities

See also Nos. 2603, 2605-7, 2749, 2755, 2803-4, 2839.

2791. HALE, M. E., JR. Phytosociology of corticolous cryptogams in the upland forests of Southern Wisconsin. *Ecology* 36 (1), 1955 (45-63). 21 refs.

An investigation of the corticolous cryptogamic vegetation in the upland forests of southern Wisconsin was initiated in 1951. Seventy-two stands of vegetation were located in 25 southern and southwestern counties. The stands, varying from 15 to 300 acres in extent, were sampled with the random-pairs methods of forest ecology. Two cylindrical quadrats girdling the trunk at 1.3 m. and base were examined on each of 2797 trees, using a species-presence method. The final data for 1.3 m. were punched on IBM cards to facilitate statistical analysis. Within the study area, 33 species of bryophytes and 55 species of lichens were collected. The prairie-forest border has a distinctive flora with little relationship to the northern conifer-hardwoods element. The most satisfactory method of organizing stand data was the use of the continuum index. The basic frequency data were analysed with various statistical techniques in an effort to measure the relative effect of environment, stand composition and host specificity on the distribution of cryptogams. The pioneer Oak openings and the climax Maple woods have completely dissimilar cryptogamic vegetation. The mesic Oak-dominated woods have a vegetation composed of species with low importance in either of the other forest types. At the stand level, the influence of host specificity is of greatest significance. Variations in the cryptogamic vegetation of stands with relatively similar environment were accountable to changes in the relative density of the tree components, principally *Quercus alba* and *Q. rubra*/*Q. velutina*. Measurements of environmental factors, such as light, bark pH, and bark moisture, appear to correlate with the data from statistical analysis. A study of inter-specific association with Cole's index proved useful in measuring the relative effect of host specificity and environment in preventing a random distribution of cryptogams. The aggregation of many cryptogams into more or less obvious communities was best regarded as a statistical association of species with similar ecological requirements. The cryptogamic vegetation of different stands and tree species in the upland hardwoods is controlled by a number of interacting variables for some of which the basic frequency data afforded an excellent means of establishing quantitative indices. *From author's summary.*

2792. TAKAHUSHI, A. The lichen vegetation in Beechwood on Mount Hakkoda. *Ecological Review, Japan* 13 (4), 1954 (203-11). [E.e.?] *From abstr. in Biol. Abstr.* 28 (12), 1954 (No. 29329).

182.5. Synecological Measurements and Methods

See also Nos. 2790-1, 3283.

2793. TROCHAIN, J.-L. La cartographie botani-

que. Application à la feuille de Thiès (A.O.F.-Sénégal). [Presentation on vegetation maps. Application in the map sheet Thiès, Senegal, French W. Africa.] *Bulletin, Institut d'Études centrafricaines, Brazzaville (n.s.)* No. 7/8, 1954 (187-200). 5 refs. [F.] (Paper presented at the 3e Conférence internationale des Africanistes de l'Ouest, Ibadan, 1949.)

Details the presentation adopted by G. Roberty (following H. Gaussen) for the Thiès sheet (1: 200,000) [cf. *For. Abstr.* 14 (No. 1067)]. This has a range of 3 spectrum colours for temperature and 6 (including white) for humidity. The latter series are overprinted on the former and touches of brown and yellow are added to distinguish compact and friable soils respectively. Physiognomy is suggested by a combination of colours but the tree, shrub, and herbaceous layers are represented by overprinted symbols, lines and dots which may be of different colour where the above series are mixed. A list of 23 series characterized by one (sometimes two) species is given, with the temperature and humidity factors, the soil type and the resulting colour, as recommended for mapping the vegetation of French W. Africa, W. of the Greenwich meridian.

187. Vegetation Types

See also Nos. 2587, 2603, 2606, 2696, 2739, 2759, 2790, 2981.

2794. RUPP, E. Beiträge zur Chorologie des Laubmischwaldgürtels. [The chorology of the mixed deciduous forest zone.] *Decheniana, Bonn* 107, 1953 (1-104 + 26 plates). 690 refs. [G.] L.S.

Groups of major associated species, named after the most characteristic, are allotted to broad geographic divisions for the entire zone (Europe, N. America, Asia). For each group a very condensed analysis is made, with copious references to literature, of available information under the main heads: phylogeny, natural range, prehistory, site relationships and biocoenology. A review is also made of the development of the mixed deciduous forest since the Cretaceous period, and a series of maps and diagrams illustrates the geographical and altitudinal range of the individual species.

2795. SCAMONI, A. Die Waldvegetation des Unterspreewaldes. [Forest vegetation of the Unterspreewald.] *Arch. Forstw.* 3 (1/2; 3/4), 1954 (122-62; 230-60 + 1 map). 34 refs. [G.]

The area lies between 44 and 52 m. above the sea in three main levels, the lowest being the water-meadows and Alder forest on alluvium, the middle one arable and Oak/Birch on valley sand, and the uppermost, the Pine dunes. There are ca. 300 km. of streams. The following associations are distinguished: Alder, Alder/Ash/Pedunculate Oak, Sycamore-Maple/Ash, Alder, Oak/Hornbeam, *Betula pubescens*/Oak (all found on nutrient-rich groundwater gleys); Beech/Oak (on podzolic types); Oak/Beech (with sub-associations on nutrient-poor groundwater gley and a humus podzol); mixed Pine forest. This classification is supported by association tables and matched with that of other authors elsewhere. There are 13 soil profiles and analyses and, for each association, notes on regeneration and the preferred silvicultural treatment are given. A

map illustrates the gradual reduction of the forest since 1786 and diagrams show the levels of the mean water-table level and of the ground surface for each association and the spring and late summer levels of the water-table in relation to soil profiles and forest associations. Along the streams an annual sustained yield of 30,000 cu.m. of Poplar could be produced and total annual yields could be raised to at least 8 cu.m./ha. by the extension of Pine, Larch, Douglas and Red Oak.

2796. BUCHWALD, K. Wald- und Forstgesellschaften der Revierförsterei Diensthoop, Forstamt Syke b. Bremen. Zugleich ein Beitrag zur Frage des natürlichen Vorkommens von Kiefer und Fichte im nordwestdeutschen Flachlande. [Natural and artificial forest communities of the Diensthoop forest range, Syke b. Bremen forest district, incorporating notes on the problem of the natural occurrence of Scots Pine and Norway Spruce in the N. German plain.] *Angew. PflSoziol., Stolzenau* No. 1, 1951. pp. 5-72 + 1 tbl. 3 pp. of refs. [G.]

Introductory sections on site factors and forest history, followed by detailed accounts (including soil profiles and silvicultural suggestions) on variants of the *Alnetum glutinosum typicum*, *Quercetoroboris-Betuletum* (with the pure and mixed Pine and Spruce plantations therein), *Betuletum pubescentis* (*Pinus sylvestris* variant), and *Querceto-Carpinetum maianthemetosum*.

2797. BUCHWALD, K. Bruchwaldgesellschaften im Grossen und Kleinen Moor, Forstamt Danndorf (Drömling). [Fenland forest communities on the Grosse and Kleine Moor, Danndorf (Drömling) forest district.] *Angew. PflSoziol., Stolzenau* No. 2, 1951. pp. 46 + 1 tbl. + coloured map 1 : 10,000. 17 refs. [G.]

Introductory sections on site factors, silvicultural and hydrological problems, followed by details of communities recognized (variants of the *Alnetum glutinosae* and *Betuletum pubescentis*) and soils (fen and bog types) in relation to groundwater level and composition, concluding with notes on Poplar-growing on such sites and hydrological tasks.

2798. LOHMEYER, W. Die Pflanzengesellschaften der Eilenriede bei Hannover. [The plant communities of the Eilenriede, near Hanover.] *Angew. PflSoziol., Stolzenau* No. 3, 1951. pp. 72 + coloured map 1 : 10,000. 30 refs. [G.]

Introductory sections on site factors and forest history, followed by details of communities recognized, viz. variants of the *Querceto roboris-Betuletum*, *Querceto-Carpinetum festucetosum silvaticae*, *Q.-C. asperuletosum*, *Q.-C. stachyetosum* and *Q.-C. filipenduletosum*, along with Scots Pine plantations in the first named and Oak/Spruce on drained Alder fen.

2799. JAHN, S. Die Wald- und Forstgesellschaften des Hils-Berglandes (Forstamtsbezirk Wenzeln). [The natural and artificial forest communities of the Hils massif (Wenzeln forest district) [N.W. Germany].] *Angew. PflSoziol., Stolzenau* No. 5, 1952. pp. 77 + coloured map 1 : 10,000 + 3 tpls. 23 refs. [G.]

Introductory sections on site factors and forest history, followed by details (with silvicultural recommendations) for communities recognized, viz.

variants of the *Quercetum petraeae-Betuletum*, *Betuletum pubescentis*, *Querceto-Carpinetum*, *Querceto-Lithospermetum*, *Fagetum*, *Cariceto remotae-Fraxinetum*, and *Cariceto elongatae-Alnetum glutinosae*, along with plantations of Norway Spruce in several of these types and of Beech in the *Querceto-Carpinetum*.

2800. BRAUN-BLANQUET, J., PALLMANN, H., and BACH, R. Pflanzensoziologische und bodenkundliche Untersuchungen im Schweizerischen Nationalpark und seinen Nachbargebieten: II. Vegetation und Böden der Wald- und Zwergstrauchgesellschaften (*Vaccinio-Piceetalia*). [Researches on plant sociology and soils in the Swiss National Park and adjacent regions: II. Vegetation and soils of the forest and suffrutescent communities (*Vaccinio-Piceetalia*).] *Ergebnisse der wissenschaftlichen Untersuchungen des schweizerischen Nationalparks (n.s.)* Vol. 4, No. 28. 1954. pp. 200 + 9 plates + 22 tpls. 58 refs. [G.] Kommission der Schweizerischen Naturforschenden Gesellschaft zur wissenschaftlichen Erforschung des Nationalparks, Nationalpark-Museum, Chur. Price Fr.20.

A comprehensive report on the results of many years' investigations, divided into sections on: vegetation (communities of the *Pineto-Ericion*, *Vaccinio-Piceion*, *Juniperion nanae* and *Loiseleurieto-Vaccinietum*), including notes on probable successions and significance for forestry; microclimatic studies in certain areas; and soils (definition of types according to Pallmann's classification; special studies of soils in relation to vegetation in the humus-carbonate and podzol series; and some notes on tests of biological activity (cellulose and protein decomposition) in certain profiles). All communities of the sub-alpine forest belt, and their soils, are subject to strong acidification as soon as the carbonate content of the parent material becomes exhausted, leading to the two climatic climax associations *Rhodoretovaccinietum* in the central Alpine region with a more continental climate, and *Piceetum subalpinum* in the moister, foggy, more oceanic regions. At lower levels in the Rhein and Inn regions, these associations are replaced by the *Piceetum montanum* and, in the valleys draining into the Po, by the *Piceetum transalpinum*. Soil development runs parallel to that of the vegetation, with a marked tendency towards the eventual development of podzols with thick mor layers. A tabular summary is given of the relationships of the plant communities to site factors.

2801. MACKO, S. Las bukowy w Muszkowicach na Dolnym Śląsku i jego warunki ekologiczne. [The Beech forests of Muszkowice and their ecology.] *Acta Soc. Bot. Polon.* 23 (3), 1954 (519-43 + 1 dgm.). 15 refs. [Pol.g.] O.B.D.

Presents data on the flora, topography, soils, and atmospheric temperature and humidity.

2802. ZÓLYOMI, B., JAKUCS, P., BARÁTH, Z., and HORÁNSZKY, A. A bükkhegységi növényföldrajzi térképezés erdőgazdasági vonatkozású eredményei. [Silvicultural conclusions from the plant-geographical survey of the Bükk mountains.] *Erdő* 3 (3-5), 1954 (78-82; 97-105; 160-71 + 3 dgms. + 2 maps). 26 refs. [Hu.]

The area surveyed is situated at 500-950 m. altitude, with brown forest soil mainly overlying limestone, and annual mean temperature and rainfall of 8° C. and 600-900 mm. The forest type changes from *Fagetum silvaticae subcarpaticum* in the cold-moist zone to *Querceto-Carpinetum pannonicum* in warmer situations, with a mixed type in the transitional zone. Each of the 3 forest zones is shown to embrace the ecological sub-types *Oxalis*, *Asperula*, *Carex pilosa* and *Melica* as well as the types *Tilio-Fraxinetum hungaricum*, *Querceto-luzuletum subcarpaticum fagetosum* and *Querceto-luzuletum subcarpaticum* according to the parent rock and more especially the exposure. The types *Querceto-Potentilletum albae pannonicum* and *Querceto-Lithospermetum pannonicum* occur only in the warmer zones at lower altitudes. The characteristics of these forest types are discussed from the point of view of their silvicultural utility. A two-dimensional diagrammatic classification is presented of the forest types and their site-qualities in the region, in relation to fertility levels and moisture conditions of the habitat. The forest types and their relationship with proposed management on the one hand and with microclimate, soil type and parent rock on the other, are shown in maps and diagrams.

2803. TEIVAINEN, L. Pohjois-Suomen tuoreiden kangas-metsien kasvillisuudesta. Pisavaaran luonnonpuistossa ja Pallas-Ounastunturin kansallispuiston eteläosassa suoritettu ekologinen metsätyypitutkimus. [The vegetation of moist heathland forests in northern Finland. Ecological studies of forest types made in the nature reserve of Pisavaara and in the southern part of the national park of Pallas-Ounastunturi.] *Annales Botanici Societatis Zoologicae Botanicae Fennicae 'Vanamo', Helsinki* 25 (2), 1952 (1-168 + 4 plates). Many refs. [Fig.] L.S.

The types covered by this detailed investigation are Cajander's *Hylacomium-Myrtillus*, *Myrtillus*, and *Dryopteris-Myrtillus* types. Soils were also studied, and special studies made of the influence of altitude on the vegetation and of tree species (Norway Spruce, Scots Pine, Birch) on the subordinate vegetation.

2804. TAPIO, S. Tutkimuksia lehtokasvillisuudesta ja lehtokasvien ekologisesta rymittymisestä Pirkkalan lehtokeskuksen keskiosassa. [Investigations into the grass-herb type of forest, and the central part of the grass-herb forest area of Pirkkala in southern Finland.] *Annales Botanici Societatis Zoologicae Botanicae Fennicae 'Vanamo', Helsinki* 25 (3), 1952 (1-57). 37 refs. [Fig.] L.S.

With special reference to the differentiation of communities according to topography and especially moisture conditions, and to the recognition of groups of species indicating particular site factors.

2805. DUGELAY, A. Le fait végétal de la forêt méditerranéenne. [The state of vegetation in the Mediterranean forest.] *Rev. for. franç.* 7 (3), 1955 (169-75 + 2 photos). [F.]

Examination of a number of burnt-over Mediterranean forests showed Pine and Cork Oak regeneration among the maquis, and the author believes that human intervention rather than fire as such, prevents the rehabilitation of these 'forests'.

2806. Türkiye ormanları. [Maps showing] forest distribution in Turkey.] Harta Genel Müdürlüğü, Ankara. 1953. 8 sheets. Scale 1: 800,000. [Turk.]

Shows, in colour, (1) forests in good condition, (2) deteriorated forest, (3) coppice, and (4) *Quercus aegilops*.

2807. BOYKO, H. A new plant-geographical subdivision of Israel. *Vegetatio* 1954 (309-18). 23 refs. [E.] Also in *Hayaar* No. 4, 1955 (19-23, II). 16 refs. [Heb.e.]

All but one of the vegetation zones of S.W. Asia occur in Israel. These are: (1) three subdivisions of the Mediterranean forest zone (sub-humid, eu-mediterranean, and sub-arid), (2) the arid border zones (Anatolio-iranian and Mauretano-iranian), (3) three steppe zones (Anatolian, Irano-turanian, and Mauretano-iranian), (4) two desert zones (Central Asiatic, and Saharo-sindic) and (5) enclaves of the Sudano-deccanian zone. Characteristic species and communities are given for each.

2808. TSOONG, P. C., and CHANG, L. M. [A preliminary survey of the vegetation of the south Chai-tian mountains.] *Bull. Taiwan For. Res. Inst. No. 41*, 1954. pp. 36. 13 refs. [Chin.e.]

Trees and shrubs are grouped into the 3 zones: Tropical forest, 300-700 m.; subtropical forest, (a) 700-1000 and (b) 1000-1800 m.; and temperate forest 1800-2300 m. A total of 338 species, 61% of them phanerophytes, was recorded. The 4 major plant communities found were the following associations: (1) *Liquidambar formosana*, *Quercus glauca*, *Schefflera octophylla* at 500 m. (2) *Machilus pseudolongifolia*, *Schima superba*, *Q. gilva* at 1200-1500 m. (3) *Chamaecyparis formosensis*, *S. superba* and *Q. longinux* at 1250 m. (4) *C. taiwanensis* and *Rhododendron formosanum* at 2000 m. From authors' summary.

2809. ROWNTREE, J. B. An introduction to the vegetation of the Assam Valley. *Indian For. Rec. (n.s.)* 9 (1), 1954. pp. 87 + 5 plates. 23 refs. Price Rs. 6 as. 8 or 10s.

2810. KINGDON-WARD, F. Report on the forests of the North Triangle, Kachin State, North Burma. *Journal of the Bombay Natural History Society, Bombay* 52 (2/3), 1954 (304-20). O.R.S.

Describes the forest types and discusses their possible economic significance.

2811. LEBRUN, J., and GILBERT, G. Une classification écologique des forêts du Congo. [An ecological classification of the [Belgian] Congo forests.] *Publ. Inst. nat. Étude agron. Congo belge (Sér. sci.)* No. 63, 1954. pp. 89 + 16 photos + 1 map. 46 refs. [F.] Price Fr. 60.

Using Braun-Blanquet's system, the authors divide the rain forests (R), the moist semi-deciduous (M), the tropophilous forests (T), the sclerophyllous forests (S), the edaphic forests based on ground-water soils (E) and the secondary forests (II) into class, orders and alliances, quoting for each the environmental factors and the characteristic species, of which > 340 are quoted, the great majority with their tolerance, leaf-shedding and seed dispersal.

indicated. A tentative climatic climax map is given, based on Bultot's rainfall map, and Köppen's climatic area labels are attached to subdivisions. Descriptions of each subdivision include notes on physiognomy, biology, soil conditions, climate including illumination, seral status and floristics. A table summarizes the whole scheme, quoting against each subdivision the limiting factors (climate, soil and/or topography), rainfall and length of dry season, type of plant in relation to radiation, temperature and air humidity, periodicity and leaf-shedding, seral status and plant geography. The main divisions are: for *R*, a plains and a mountain order; for *M*, 3 alliances; for *T*, a Sudan and a Zambesian order; for *S*, a mountain and a littoral order; for *E*, 6 orders (river-bank pioneer, riverain, periodically inundated, marsh, alluvial valley and mangrove); for *II*, 3 orders, fallow and regrowth of the plains, secondary forest proper, and regrowth and secondary forest of the mountains. A graph contrasts the rapid early growth of the species in *II*—*Musanga cecropioides*, *Caloncoba welwitschii* and *Terminalia superba*, with the slower growth of *Gilbertiodendron dewevrii* in *R* and *Oxystigma oxyphyllum* and *Scorodophloeus zenkeri* in *M*.

2812. GOODLETT, J. C. Vegetation adjacent to the border of the Wisconsin drift in Potter County, Pennsylvania. *Bull. Harv. For. No. 25*, 1954. pp. 93 + 11 photos. 61 refs.

The author presents a theory to account for the present vegetation of this area: (1) the mantle of surficial materials (due to glacial drift) is primarily responsible for the uniformity of vegetation; (2) forest vegetation was absent or very restricted during the formation of these surficial deposits; (3) local distribution of species is largely determined by variations in the physical composition of the surficial deposits, which cause local variations in depth to water-table; (4) disturbance of the upper parts of the surficial materials by windthrows has affected in the past, and continues to affect, rates of erosion, process of soil formation, and the development and composition of the vegetation. Lumber-

ing operations in the 100 years following settlement resulted in clear-felling of almost the whole area, and the proportions of the various species were markedly changed in the ensuing stands, which contain virtually no White Pine [*Pinus strobus*]. The evidence suggests that the White Pine population had been built up slowly over centuries, by widespread local cataclysms in the forest, largely the result of hurricanes. Windthrow of large trees, singly and in groups, opened the canopy and exposed the mineral soil, creating conditions favourable for the establishment of White Pine. Rapid cutting of the forest eliminated the normal means by which the forest floor is disturbed, thus encouraging the growth of suppressed hardwoods and Hemlock and the establishment of hardwoods of coppice and seedling origin.

2813. BEARD, J. S. The classification of tropical American vegetation-types. *Ecology* 36 (1), 1955 (89–100). 20 refs.

The classification of plant formations in tropical America proposed by the author in 1944 [cf. *For. Abstr.* 6 (p. 149)] is reviewed in the light of subsequent work. The original 26 formations are expanded to 28. *From author's summary.*

2814. STRAATMANS, W. Reclamation of tidal mud flats in Tonga. *Technical Paper, South Pacific Commission, Sydney No. 53*, 1954. pp. 18. 10 refs. Price 2s.

Vegetation changes occurred rapidly after reclamation. The two types of tidal forest are (1) Mangrove (*Rhizophora mucronata*) and (2) *Lumnitzera* forest (mainly *L. littorea*, but with patches of *Excoecaria agallocha* and *Xylocarpus moluccana*). In (1), *Rhizophora* died off in the depressions, where fresh water now accumulates, and a fern, *Acrostichum aureum*, invaded rapidly and formed the first ground cover, followed by other weeds. In (2) the chief change was a great increase of *Clerodendron inerme*. Soil profiles, groundwater fluctuations and agricultural plantation trials on newly-reclaimed land are described.

2. SILVICULTURE

See also Nos. 2580, 2726, 2729–31, 2795–7, 2970.

2815. HAWLEY, R. C., and SMITH, D. M. The practice of silviculture. J. Wiley and Sons Inc., New York; Chapman & Hall Ltd., London. 6th ed. 1954. pp. vii + 525. Many refs. Price £3.

The last previous revision was that of 1946 [cf. *For. Abstr.* 8 (No. 1692)]. The present edition has been completely rewritten and much expanded (over 500 pp. compared with 350). Among new subjects treated in some detail, is the use of poisons for killing unwanted trees.

2816. KALNINŠ, A. I. Vozmožnosti povyšeniya proizvoditelnosti lesov Latvijskoj SSR. [Possibilities of increasing the productivity of the forests of the Latvian SSR.] In *Naučnaja Sessija po Voprosam Biologii i sel'skogo Hozijskva*, Riga, 22–26 Oktjabrja 1951 g. Akademiya Nauk SSSR, Moskva 1953 (pp. 190–7). 2 refs. [Russ.] H.S.B.

A conference paper, discussing in general terms the afforestation or regeneration of difficult sites, importance of seed source, use of exotics, work on propagation by cuttings and the induction of early seedbearing, forest drainage and tending operations. Green cuttings of Larch gave 80% rooting after treatment with growth-regulator solution containing 1–3% sugar, vitamins of the B group or mineral nutrients [no detail given]. *Populus trichocarpa* is said to show great promise, as do also Larches and *Quercus borealis*.

2817. BERGSJÖ, N. Några skogliga problem i Norrland. [Some forest problems in N. Sweden.] *Norrlands SkogsvFörb. Tidskr.* 1954 (4), (515–26). [Sw.]

A general discussion of methods of regeneration, species, the value of even- and uneven-aged stands,

thinning, size of working unit; the use of chemicals to control insects and weed trees; small wood, transport, labour and the danger of overfelling.

22. SILVICULTURAL SYSTEMS, CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See also Nos. 2622, 2767, 2824, 3055.

2818. HEGER, A. Erfolgsaussichten der vorratspfleglichen Waldwirtschaft. [Prospects of success in 'management for the benefit of the growing stock'.] *Arch. Forstw.* 3 (1/2), 1954 (1-22). 11 refs. [G.]

The author, with 10 years' experience in tending quasi-natural forests in the West Carpathians, took over in 1920 the Komotau (C.S.R.) charge, where he immediately stopped clear felling, and instituted a 'méthode du contrôle' with a 3-year felling cycle. Drawing partly on this Komotau experience and partly on analyses carried out with 10-acre plots in 49 stands in Bärenfels (E. Germany), he makes a general assessment of the value of the system. Its effects on the 'security of management' in relation to damage by game, insects, fungi, and atmospheric factors (rime frost, snow-breakage, storms, industrial fumes) are detailed. The system, chiefly by the continual removal, in the 3-year cycle, of the less resistant stems and the favouring of healthy ones with well developed crowns, produces a growing stock better able to withstand all these injuries. The % of fuelwood due to decay falls away and, with no clear-felling and more resistant trees, insect damage also become less important. The next section deals in some detail with regeneration under the system, where the aim has been to re-establish natural mixtures and introduce valuable species by underplanting, sowing, soil wounding and protection from game. The effect of the triennial fellings on increment is illustrated in a table of data from 3 control plots at Komotau and a comparison with increment in even-aged stands is made.

It is estimated that an increase in increment of ca. 12% over that of the clear-felling system has been obtained at Bärenfels by the use of the 'méthode du contrôle'. The effect of the system on the security-of-management factors raises this to ca. 15%.

2819. DIJAČENKO, A. I. Splošne rubki v hvoynih lesah Severnogo Kavkaza. [Clear fellings in the coniferous forests of the Northern Caucasus.] *Lesn. Hoz.* 5 (6), 1952 (66-7). [Russ.]

Investigation of the felling methods applied between 1933 and 1951 in the Pine [*Pinus sylvestris*?]/Spruce [*Picea orientalis*?]/Fir [*Abies nordmanniana*?] mountain forests (1500-2500 m.) of the Stavropol region (climate continental, frosts persisting throughout summer; rainfall in 1951, 919 mm.) situated on slopes of up to 60° with shallow loamy or marly soils or, more rarely, degraded chernozems, showed that all types of clear felling and heavy exploitation failed to secure natural regeneration and led to soil erosion. On the other hand, fellings

under the uniform system (removal of the stand in three operations) on 15-45° slopes gave good results, recent counts on a 1949 felling giving the following number of natural seedlings per sq. m.: 1-3 years—13; 3-5 years—3, with single seedlings > 5 years.

2820. CHAPMAN, G. L., and MCGOWEN, N. W. A comparison of five commercially clearcut White Pine stands in Southern Maine eight to thirteen years after cutting. *Tech. Note. Univ. Me. For. Dep. No.* 34, 1954. pp. 2 + 1 tbl.

In the 5 areas, predominantly *Pinus strobus*, studied, commercial cutting resulted in a change to mixed hardwoods in one case and only minor and temporary changes in the other 4. In 3 out of 5, however, it resulted in stands that will produce much lower yields in quantity and quality during the next rotation.

2821. LEBLANC, H. A new approach to the northern Spruce regeneration problem. *For. Chron.* 30 (4), 1954 (372-9).

In view of the notorious failure of natural regeneration of pure *Picea mariana* stands after clear felling, a study was made of the soil in an untouched stand on a 9-year-old cut-over site, both of the *Calliergon-Kalmia* type. Clear felling had had no apparent effect on % organic matter, total N, C/N ratio, or assimilable P. Humus acidity had increased very slightly. There were, however, significant differences in the content of mineral nutrients. The Mg/Ca ratio had fallen from 0.2-0.3 to 0.1; the Fe/K ratio had risen from 0.1 to 0.44; the concentration of Mn had risen from 84 to 183 p.p.m. It is suggested that the augmentation of Mn and diminution of Mg in the soil produce a lack of equilibrium that may well be the cause of the absence of *P. mariana* seedlings on some parts of this cut-over area.

2822. PFELSTICKER, K. Statistische Betrachtung zum Naturverjüngungserfolg im früheren Königreich und späteren Bundesland Württemberg unter dem Einfluss der Lehren Karl Gayers und Christoph Wagners. [A statistical examination of the success of natural regeneration in the former Kingdom and later Federal Land of Württemberg under the influence of the teachings of K. Gayer and C. Wagner.] *Allg. Forst- u. Jagdztg.* 124 (8), 1953 (230-5). 1 ref. [G.]

In connexion with Haufe's study on the results of the *Blendersaumschlag* [see *For. Abstr.* 14 (No. 3234)] the author uses State forest statistics for selected years from 1882 to 1941 to calculate, as an indirect measure of natural regeneration, the planting stock used per cu.m. of timber felled (a) for the whole of Württemberg and (b) for 3 forest districts each, in each of the 5 major forest regions. From the same data he estimates the area naturally regenerated in % of the area felled, which shows an upward trend from nil before the 1890's to 56% in 1933 and 50% in the war year 1941. Some figures are appended to illustrate the decline in the area of Silver Fir and Scots Pine, and the increase of Norway Spruce, in the Schwarzwald, a trend which has not been arrested by the natural regeneration technique of the *Blendersaumschlag*.

2823. ŠAFAR, J. Die Entwicklung des Tannenzungwuchses in den Plenterwäldern Kroatiens. [The development of young growth of *Abies alba* in Croatian selection forest.] *Schweiz. Z. Forstw.* 105 (11; 12), 1954 (592-613; 712-33 + 2 photos). 54 refs. [G.g.f.]

Comparative studies made on Silver Fir reproduction in mixed selection forest of two types (*Fagetum abietetosum* and *Abieto-Blechnetum*) showed that certain rules govern the behaviour of stems of the same height (4-5 m.) but of different ages, occupying different storeys and under different canopy densities. The age of such trees (determined at a height of 10 cm.) varied from 20 to 140 (average 60) years. Most of the single scattered Firs (a) were 40-80 years old, but those growing in groups (b) only 20-60. Two-fifths of (a), but only one-tenth of (b) were over 70. In a stand with fully developed selection structure (*Vertikalschluss*) (1) the majority of (a) were 40-80, in a stand of storeyed structure (*Schichtschluss*) (2) 60-100, and in stands of intermediate structure (3) 20-60. The length of clean bole generally increased with age: up to 70 years the live crown formed $> \frac{1}{2}$ total height, but after that age less. Self pruning appears to be more effective in (a) than in (b). The length of live crown is usually noticeably less in (1) and (2) than in (3), for trees of all ages; taper is least in (1) and greatest in (3). No influence of parent rock or soil could be detected, and it is concluded that stand structure and age are the determining factor in the development of Fir in selection forest. Investigation of roots showed that the diameter of the tap-root increases with age regardless of the growth of the stem. Lateral roots continue to develop up to the age of 70.

The silvicultural implications of these findings are discussed and conclusions drawn, in particular the superiority of group regeneration of Fir to single-stem mixtures.

222. Coppice, Pollarding and Lopping Systems

See Nos. 2826, 3015.

226. Changes of Silvicultural System. Conversion (by System or Species)

See also Nos. 3015, 3089.

2824. KÖNIG, H. Probleme der Umstellung der Kahlschlagwirtschaft auf vorrathspfleghche Waldwirtschaft. [Problems of conversion from management based on clear felling to management based on tending of the growing stock.] *Wald* 2 (2), 1952 (51-5). [G.]

An official exposition in general terms.

2825. WŁOCZEWSKI, T. Dotychczasowe wyniki przemiany składu gatunkowego drzewostanów nadleśnictwa Rychlik (dawniej Trzcianka). [Results of converting [Scots Pine] stands [to other species] in the forest division of Rychnik (formerly Trzcianka).] *Roczn. Nauk leśn.* No. 5, 1954 (251-85). 8 refs. [Pol.pol.russ.] (*Prace Inst. Bad. Leśn.* No. 124.)

Regeneration by sowing and planting has been done for over 25 years under the considerably

thinned canopy of 40- to 100-year-old Pine stands. *Pseudotsuga taxifolia*, *Abies alba*, *Picea abies*, and broadleaved species such as Beech, Oak, Lime, Ash, Alder, Sycamore Maple and Birch, were introduced. The soil (mostly sand) was hand-cultivated in strips. It was found in 1951 that the growth of plantations depended to a great extent on the depth of the water-table and amount of the clay fraction. Best results were obtained when the water-table was 0.8-1.2 m. below ground or when the soil was a sandy loam; the height of plantations there reached 8-10 m. [at ca. 20 years?], with a closed canopy, compared with 0.4-1.0 m. and stands of poor density when the water-table was $> 2.5-3.0$ m. below ground.

2826. GALOUX, A. La conversion des taillis simples en peuplements résineux. [The conversion of simple coppice to conifers.] *Trav. Sta. Rech. Groenendaal (Sér. B)* No. 17, 1954. pp. 35. 12 refs. [F.]

A detailed account of experiments made with the object of determining the stage in coppice rotation at which coniferous species can best be introduced. The coppice consisted mainly of Oak and Birch, and the conifers tested were Spruce [*Picea abies*], and Silver Fir [*Abies alba*], which were introduced singly, in various proportions together, and along with Beech. The experimental data are set out in tables and graphs. The main conclusions reached are as follows: Clear cutting of the coppice before planting is advisable only for light-demanding species and is to be avoided particularly for Beech and Fir, which suffer from lack of shade and also from competition of more light-tolerant species. The competition of Spruce is deleterious to Beech and Fir, even when they are introduced under young coppice, e.g. at mid-rotation (14 years). The most satisfactory method is to plant Beech and Fir under a light canopy of old coppice (28 years), to introduce the Spruce 3 years later, and to remove the coppice gradually at intervals of 3 years. Experiments with planting stock of different ages demonstrated the great superiority of 3- or 4-year transplants over 1- or 2-year seedlings, the superiority in height being still maintained at 43 years. Comparison of different forms of mixture—stem by stem, alternate rows, and 1-are groups—showed the great superiority of the last. Figures are given for increment and yield of Fir at 39 years, and its suitability for planting in the Ardennes is discussed.

228. Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand

See also Nos. 2847, 3284, 3358.

2827. SOMKUTI, E. Törzsosztálkozás a növekedés és fejlődés alapján. [Tree classification on the basis of growth and development.] *Erdő* 3 (3), 1954 (82-9). [Hu.]

The 'dynamic' approach of the Mičurin-Lysenko school to plant growth phenomena is extolled over Kraft's crown classes, which are condemned as purely 'mechanistic'. Nesterov's growth-rate classification and Roth's (less dynamic) proposals for

Hungary are described. An editorial note reminds the reader of the recent Soviet enunciation rejecting tree classification by growth characteristics as not yet sufficiently supported by scientific evidence.

2828. ATTENBERGER, J. Mischwald im Vorland der Alpen. Beitrag zu Fragen des Bestockungs-aufbaus und der Wuchsdynamik im Mischbeständen mit Buche-Tanne-Fichte im Bayrischen Oberland. [Mixed forest in the Alpine foothills. Contribution to questions of stand structure and composition and of the dynamics of growth in mixed Beech, Silver Fir and Norway Spruce forest in the Bavarian highlands.] *Forstwiss. Forsch.* No. 3, 1954. pp. 71. Many refs. [G.g.]

Gives the results of studies of a large number of stands differing in composition and structure, with the object of drawing conclusions relevant to the management of forests in this region.

2829. WŁOCZEWSKI, T. Materiały do poznania zależności między drzewostanem i glebą w przetrzeni i w czasie. [Materials for ascertaining the spatial and temporal relationship between forest stands and soil.] *Roczn. Nauk leśn.* No. 5, 1954 (161-249 + 1 tbl.). 40 refs. [Pol.russ.f.] (*Prace Inst. Bad. Leśn.* No. 123.)

Observations were made in 1936 and 1949 on a 200 × 60-m. plot in natural or semi-natural forest in the Białowieża National Park; all trees with d.b.h. > 5 cm. were enumerated and mapped. The plot consists of 3 parts: (1) deep fresh sands with Norway Spruce/Scots Pine; (2) sands on clay, with Pine/Spruce/Oak, and (3) deep layer of clay, with Oak. During the 13 years, Spruce increased and Pine, Birch and, to a less extent, Oak decreased in (1); in (2) the total number of trees diminished by 10%, owing to the death of some Oak, Birch, and Lime, the b.a. of Spruce and Oak increasing, that of Birch and Lime decreasing; in (3), the greatest changes were due to the recruitment of young Lime, Hornbeam and Spruce into the main stand. The b.a. increment, excluding dead stems and recruitment, for the 13 years, was 6.3, 5.8 and 3.5 sq. m./ha., for (1), (2), and (3) respectively; and 9.7, 10.5 and 10.5 sq. m./ha., including them. The time of passage was least for d.b.h. 24-36 cm. in (1) and (2), and for d.b.h. 52-72 cm. in (3). In (1), Spruce regeneration predominated; in (2) the order was: Lime, Hornbeam, Spruce, Sycamore Maple and Oak; in (3) regeneration was the most abundant, with Lime predominating. On the whole, Pine was regressing fairly fast, Spruce much less so and was even likely to increase; Birch would probably soon disappear; Oak was likely to survive for several centuries.

23. REGENERATION AND FORMATION OF STANDS

2830. MIGUET, J. M. Boisement et régénération de forêts reliques en zone tropicale: les forêts de Saint-Philippe à La Réunion. [Afforestation and regeneration of relict forests in the wet tropical zone: the forests of St. Philippe, Réunion.] *Rev. for. franç.* 7 (3), 1955 (187-200). [F.]

Describes the plantations of *Casuarina equisetifolia* and *Pandanus utilis* near the coast, and methods of encouraging and supplementing natural regeneration in the relict forest further inland.

2831. [Natural and artificial regeneration of *Chlorophora excelsa*.] *Rep. For. Dep. Nyasaland.* 1952, 1952 (9-10).

Note on the invasion of a 22-year *Khaya nyasica* plantation by Iroko and an account of successful trial plantings.

2832. KERMODE, C. W. D. Have methods used for regenerating Teak in Burma been failures? *Burmese For.* 4 (2), 1954 (76-86). [E.]

Criticizes an article on Teak regeneration by U Saw Tun Aung [see *For. Abstr.* 14 (No. 3249)], and maintains that artificial regeneration by *taungya* plantations, and assisted natural regeneration by the 'seedling coppice method' [cf. *For. Abstr.* 14 (No. 3248)] are both satisfactory on suitable sites.

231. Natural Regeneration

See also Nos. 2773, 2775-6, 2812, 2819-23, 2830-2, 2995, 3001.

2833. PETROV, A. D. Traktornaja borona 'drakon'. [The 'dragon' tractor harrow.] *Lesn. Hoz.* 5 (7), 1952 (90). [Russ.]

A cast-iron or steel cigar-shaped body, hollow towards the middle, bearing on both faces 3 rows of triangular-pyramidal teeth (12 cm. high, 10 cm. base; spaced 14-16 cm. tip-to-tip), with a swivel loop at each end for traction. Scarifies a strip 40-60 cm. wide to 10 cm. depth, riding easily over obstacles. Two or three of such harrows can be drawn by one tractor.

2834. STEIN, W. I. Natural reproduction of Shasta Red Fir [*Abies magnifica* var. *shastensis*] from a single good cone crop. *Res. Note. Pacif. Nthwest. For. Range Exp. Sta.* No. 100, 1954. pp. 5. 2 refs.

The Fir regenerated naturally and abundantly (3019 seedlings/acre with a survival of 1708/acre at the end of the second growing season) on a clear-felled area of 35 acres, with adequate seed available from the uncut stand. Seedlings germinated and survived best on mineral soil but did well on other surfaces (fine litter mixed with soil, or duff).

2835. BEVER, D. N. Evaluation of factors affecting natural reproduction of forest trees in Central Western Oregon. *Res. Bull. Ore. Bd. For.* No. 3, 1954. pp. 49. 45 refs.

This study was started in 1947 to investigate the value of various types and quantities of seed source in the establishment of reproduction on cut-over land and to determine the apparent effects of various factors (e.g. slash disposal, ground vegetation, aspect) upon the rate of restocking. Most of the areas investigated are clear-cut with provision for a seed-source in the form of uncut corners and blocks, or adjacent uncut timber. The data are set out and discussed in detail. For the two most important species, Douglas Fir and Western Hemlock, it was found that more than average restocking occurred where the following factors were present: N.E. aspect, light weed or shrub cover, and lightly burnt slash. S. aspects, heavy ground vegetation, hard burns or heavy slash, were unfavourable. A test of burnt vs. unburnt plots showed that there was a significant difference between them, with better-

stocking on the burnt plots for Douglas and for all species combined. For Western Hemlock considered alone there was no such difference.

The following types and amounts of seed source appeared to have about equal values in terms of stocking produced: (a) 1 seed-tree/acre, (b) 6 acres of seed-block/40 acres, (c) 3300 ft. (50 chains) of uncut timber edge within $\frac{1}{4}$ mile of centre of 40 acres, (d) 4620 ft. (70 chains) of uncut timber edge between $\frac{1}{4}$ and $\frac{1}{2}$ mile of centre of 40 acres.

A study of this information led to the following conclusions: (1) There appeared to be a measurable relationship between the amount of seed source and amount of stocking on slash-burnt areas, but no such relationship on unburnt areas. Burnt tracts restocked in a more orderly and predictable manner than did unburnt and had more complete stocking for the same amount of seed source. (2) Where other factors are favourable, the amounts of seed source required by the Oregon Forest Conservation Act proved to be adequate, but where a combination of unfavourable conditions existed, especially unfavourable aspect, reproduction was not always forthcoming even with seed sources greatly exceeding those legally required.

2836. FARRAR, J. L., GRAY, D. W., and AVERY, D. **Jackpine reproduction.** *Pulp Paper Mag. Can.* 55 (12), 1954 (136-146). 16 refs.

[Cf. *For. Abstr.* 13 (No. 2010).] Dense 60-year stands in Ontario have no advance growth, owing to lack of light, poor floor conditions and failure of cones to open. A detailed comparison is given of the effects, 4 years after clear felling, of the following treatments or combinations of them: (a) conventional autumn logging to 100-in. lengths and 3 $\frac{1}{2}$ -in. tops, hand stacking along 12-ft. roads, spaced 66 ft., extraction over snow, windrowing slash between roads and broadcast burning; (b) direct sowing; (c) lopping and scattering slash without burning; (d) ditto with broadcast burning; (e) scarification by diskings; (f) ditto by cable skidding in tree lengths; (g) ditto by skidding in bunches. The best stocking of seedlings was got by (g) combined with (c) over the scarified areas. Very few seedlings resulted from (a), and early spring burning failed to consume the lower organic layer. Sowing is necessary, and the best way is (c) over scarified areas. Most germination took place in the first two years and most damage to seed and seedlings (rodents and frost) occurred in the first germinating season. An integration of logging, scarification and a single handling of slash is required for a practical technique. Data are included for Aspen regeneration.

2837. WALKER, L. C. **Early Scrub-oak control helps Longleaf Pine seedlings.** *J. For.* 52 (12), 1954 (939-40).

Survival and growth of seedlings released (by Ammate poisoning) during the first year after germination, were significantly greater than in those released in the second and third years, and in unreleased plants. Where the Oak was poisoned one year before germination, diam. growth was significantly less, owing to grass invasion, than in plots released at germination.

2838. WALKER, L. C. **Release Longleaf seedlings early.** *Sth. Lumberm.* 189 (2369), 1954 (169-70).

Research by the Southern Forest Experiment Station in Alabama shows that the seedlings should be released from competing scrub Oaks before they are a year old, but that the Oaks should be left alive until Pine germination takes place, to control weeds and grass.

2839. McNEILL, W. M. **Studies of surface vegetation and natural regeneration in a mature Scots Pine wood in Aberdeenshire.** *Forestry* 28 (1), 1955 (49-65 + 4 photos).

Observations and data are recorded on the changes that took place in the composition and pattern of the surface vegetation immediately after regeneration fellings in a 75- to 85-year-old plantation composed principally of *Pinus sylvestris*, in which natural regeneration was known to be difficult. It is concluded that, though the site is in every way suitable for Scots Pine, the natural regeneration of such a stand, unless specially assisted, is difficult and uncertain, and can be obtained only after a period of succession by other species, particularly Birch (*Betula pubescens*) and Rowan (*Sorbus aucuparia*). In other conditions, notably if the soil is more sandy and general vegetation simpler and more scanty, natural regeneration of Scots Pine can be obtained more readily. The soil and site factors investigated are, however, similar to those in many artificially formed coniferous plantations in N.E. Scotland.

2840. KONEV, G. I. **Estestvennoe vozobnovlenie na vyrubkah v kedrovnikah. [Natural regeneration on felling sites in *Pinus sibirica* forests.]** *Lesn. Hoz.* 5 (6), 1952 (57-60). [Russ.]

The large-scale concentrated fellings in the Ural forests, where unmerchantable trees are left to provide seed, have not resulted in adequate regeneration, owing to rodents' eating the seed. Sample counts for various tree species are tabulated. 'Nest' plantings are suggested, using the wildlings that grow vigorously on burned areas.

2841. ČERNIKOV, V. A. **Sodeistvie estestvennomu vozobnovleniju listvennicy na Dal'nem Vostoke. [Means of inducing natural regeneration of *Larix dahurica* in the Soviet Far East.]** *Lesn. Hoz.* 5 (7), 1952 (27-30). [Russ.]

In the Khabarovsk region *L. dahurica* usually fails to regenerate naturally, the felling sites becoming waterlogged and overgrown with shrubby Birches, but groups of satisfactory regeneration occur locally where the litter and/or the surface of the mineral soil have been disturbed. Some results are given of studies made in 1949 of the regeneration occurring in various forest types on skidding trails varying in age and intensity of working. It was found that on hard-worked trails, where the top soil had been scraped off and clay exposed, no regeneration of *L. dahurica* was present 8 years after the skidding operations. On more lightly worked trails regeneration was present (up to 50,000 seedlings/ha. where only loosening of top soil and litter had occurred). In general, it is concluded that regeneration was best where skidding had neither removed nor mixed the soil horizons to any

considerable extent, especially where only the herbaceous and moss layers had been destroyed and the litter and soil loosened to a depth of 6-8 cm. Recommendations are that groups of seedbearers be left (< 8-12 trees/ha.) and that in moderate to good seed-years the soil should be scarified (various methods suggested for the various types) in strips. As shortage of suitable equipment hampers the efforts of the local silvicultural sections, it is suggested that the utilization sections should do more to help them, e.g. by skidding so far as possible at suitable times (early spring), avoiding damage to seed-bearers, and supplying equipment and labour for soil scarification in the summer.

2842. SARVAS, R. Koivun uudistumisesta. [Regeneration of Birch.] *Metsät. Aikak.* 1954 (12), (476-8, 487). [Fie.] (*Metsätietoa*, Helsinki 1954 (2).)

Natural regeneration can be increased by clear felling and burning over, but this usually favours *B. pubescens*, the poorer of the two main species. From author's summary.

2843. MIŠKOV, F. F., and TREGUBOV, G. A. Vozobnovlenie barhata amurskogo putem poraneniya kornei. [Regeneration of *Phellodendron amurense* by wounding roots to induce suckering.] *Lesn. Hoz.* 5 (5), 1952 (56-8). [Russ.]

In 1951 the Far Eastern Forest Research Institute drew attention to the fact that, to improve the stocking of the woods, suckering of *P. amurense* could be stimulated by wounding or severing the roots. After various trials the following procedure was worked out: on trees due to be felled (dying, badly damaged by fire etc.) all the roots are cut through, starting at 30 cm. from the stem, at 2-m. intervals; trees from which the cork has not been removed have only one of their lateral roots cut through at a distance of 2.5m. from the stem and thereafter at 1-m. intervals; those from which the cork has already been removed also have only one root cut through, but at 4 m. from the stem, and thereafter at 1-m. intervals. The roots should be severed early in spring, and not later than 15 May. Where a cut is to be made, the topsoil is removed from a 30 × 30 cm. patch and the root severed with a sharp axe; the cut ends should not be covered but must keep contact with the soil, so as to prevent the root drying up. Treated trees showed no external signs of disease, and fruited as well as untreated ones. The rate of growth of suckers in the first year was 2-4 times as fast as that of seedlings in 'nest' sowings.

232. Artificial Regeneration

See also Nos. 2830-2.

2844. OGIEVSKIĬ [OGIEVSKIĬ], V. V. [Editor]. Lesní kultury. [Forest plantations.] *Lesn. Knihovna (velká Řada)* No. 11, 1953. pp. 543. 221 refs. [Cz.] Price Kčs.46:20.

A translation from Russian of the collective work 'Lesnye kultury' by V. V. Ogievskiĭ, I. D. Braude, A. E. Dijačenko, E. P. Zaborovskii, A. S. Kozmenko, K. F. Miron, N. S. Popova, and N. I. Rubcov. The original is used in the U.S.S.R. as a university textbook. The content is divided into the major sections: (1) forest seed husbandry; (2) rearing and

preparation of seedlings, plants, and cuttings; (3) forest plantations; (4) introduction of exotic tree species of economic importance and (5) forests as a soil-improving and anti-erosion influence. The references, mainly to literature of the past 20 years, are Russian throughout.

2845. SOMORA, J. Umelá obnova limby v Tatranskom národnom parku. [Artificial regeneration of *Pinus cembra* in the Tatra National Park.] *Les, Bratislava* 1 (12), 1954 (4-12). [Slovak.]

To protect *P. cembra* seeds from birds and rodents it is important to collect seed as early as possible, about mid-September, when the birds begin their seed-foraging flights. After a preliminary examination (germination test, appearance, colour), the cones are spread in 10-cm. layers and turned every 3 days. After 2-3 weeks, when they have lost much of their original moisture, the seed is extracted by hand (difficult with very dry cones). After storage in a 30-cm. layer in an open shed, followed by stratification in sand, it is sown in special beds. To protect the seedlings against birds and rodents, the bed (10 × 10 m.) is enclosed in a wire cage (0.5 cm. mesh) 160 cm. high, with the netting sunk 50 cm. deep in the soil. The stratified seed is sown by hand in the spring or autumn during a calm cloudy day in drills 3-6 cm. deep, 5 cm. wide and 7-10 cm. apart in soil which has been previously loosened with a spade and mixed with compost; it is sown densely and watered. During recent years, 35-40 kg. of seed has been sown every year in this nursery, with an annual yield of ca. 100,000 seedlings. More than 50% of seeds germinate within the same year, the first seedlings appearing 4 weeks after sowing. The soil should be duly loosened and the nursery weeded. After 2 years, the seedlings are transplanted into another nursery (in the Megušov valley, alt. 1300 m.) where they remain for 4-5 years, after which they are planted out in holes of 40 cm. diam. spaced at 3.3 m. (1000/ha.). The tree begins to flower when 50-60 years old, and seed-years recur every 4-5 years.

2846. MARKOVIĆ, L. O prioritetu, izboru vrsta i gustini sađenja u veštačkom pošumljavanju. [Priority of tasks, selection of species and density of planting in artificial reforestation.] *Šumarstvo* 7 (11/12), 1954 (611-8). [Serb.e.f.]

A general discussion of reforestation problems in Yugoslavia, and of the order in which they should be tackled.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 2734, 3108, 3707.

2847. Comment reboiser: le choix des essences. [Reforestation: the choice of species.] *Étud. Com. consult. Rebois.*, Paris No. 1, 1953. pp. 7 + 6 dgms. [F.]

Gives diagrams for each region of France (N.W., W. and Centre; S.W.; N.E. and E.; medium and high mountains; Mediterranean low mountain region; and Mediterranean) showing the most suitable coniferous and hardwood species for different soils and sites.

2848. Comment reboiser: l'utilisation du Douglas dans les reboisements. [Reforestation: the use of Douglas Fir.] *Étud. Com. consult. Rebois., Paris* No. 7, 1954. pp. 15 + 1 dgm. [F.]

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 2738, 2844, 2873, 3267.

2849. FOURCHY, P. Études sur le développement et la production de quelques peuplements de Douglas (*Pseudotsuga douglasii* Carr.) [The development and yield of some stands of *P. taxifolia* [in France].] *Ann. Éc. Eaux For. Nancy* 14 (1), 1954 (85-151 + 10 photos + 1 gph.). 43 refs. [F.g.e.]

Discusses the silvicultural characters and requirements, increment and yield of Douglas Fir, on the basis of existing stands in the north, east, and centre of France. The importance of pruning and frequent thinning is stressed.

2850. BRÜCKNER, E. Anbauversuche mit fremdländischen Holzarten im Wuchsgebiet des Erzgebirges. [Trials with exotics in the Erzgebirge region.] *Wald* 2 (2), 1952 (55-7). [G.]

Gives, for a number of trial plantings dating from 1904-11, mean heights, mean diameter and standing volume in 1951, compared with local species, tabulating figures for *Pinus strobus*, *Pseudotsuga taxifolia*, *Larix leptolepis*, *Picea sitchensis*, *P. pungens*, *P. engelmannii*, and *Chamaecyparis lawsoniana*.

2851. JANKAUSKAS, M. Perspektivų vnedrenija bystrorastučių hvojnų porod v lesah Lietuvos SSR. [Prospects for the introduction of fast-growing conifers in the forests of Lithuania.] In *Naučnaja Sessija po Voprosam Biologii i sel'skogo Hozjaistva, Riga, 22-26 Oktjabrja 1951g.* Akademija Nauk SSSR, Moskva, 1953. pp. 228-37. [Russ.] H.S.B.

Gives a list of the exotic conifers known to exist in Lithuania, with brief notes on the forests and climate of the country and some growth figures for those species tried in the forest, viz. *Larix decidua*, *L. sibirica* and *L. leptolepis* [cf. *For. Abstr.* 16 (No. 2044)], *Pseudotsuga [taxifolia] vars. caesia* and *glauca*, *Pinus strobus* and *Abies sibirica*. All of these, but most especially *L. decidua*, show better growth on good sites than the indigenous Pine and Spruce, with which tabular comparisons are made. The oldest plantations (up to 90 years) are those of *L. decidua*; figures cannot be given for *L. leptolepis* beyond 30, and for the remaining species beyond 50 years. No serious trouble has been experienced with diseases or pests: Larch canker is unknown, but *Cronartium ribicola* has been found on *P. strobus*. A sketchmap shows the location of the main plantations of the species discussed.

2852. KORNEV, V. P. Kul'tury sosny krymskoj na peskah srednego Dona. [Plantations of *Pinus nigra* var. *caramanica* on the sands of the middle Don.] *Lesn. Hoz.* 5 (5), 1952 (38-9). [Russ.]

The author advocates changing to *P. sylvestris*, adducing the following comparative mean figures for 22-year plantations (figures in brackets are for *P. sylvestris*) height 3.28 (6.58) m.; diameter 4.8

(8.2) cm.; quality class V (III); current height increment 15 (30) cm.; volume/ha. 17.4 (66) cu.m.; stems/ha. 3670 (3040). [Cf. *For. Abstr.* 13 (No. 2883).]

2853. AGEEV, A., and LENSKIĬ, M. A. Selekcija i introdukcija sekvoji na Černomorskom poberežje Kavkaza. [Selection and introduction of *Sequoia* on the Black Sea coast of the Caucasus.] *Lesn. Hoz.* 5 (6), 1952 (78-9). [Russ.]

VNIILH is said to have succeeded, by means of artificial cross-pollination, in obtaining *Sequoia* seed [species not clearly indicated] of which up to 60%, instead of the usual 10-30%, were full weight. Their germinative capacity was higher than that of natural seed, while seedlings raised from them were harder and more vigorous. When planted out in the Crimea they adapted themselves well to the new environment, with survival > 90%. Cuttings taken from 50- to 80-year-old *Sequoia* gave unsatisfactory rooting even after treatment with growth regulators, whereas those taken from physiologically young plants (1- to 2-year seedlings) rooted almost 100% without growth regulators.

2854. ANTIPOVA, V. I. Lesokul'tury sekvoji v Jaltinskom leshoze. [Cultivation of *Sequoia* in the Yalta forest district.] *Lesn. Hoz.* 5 (6), 1952 (79). [Russ.]

The fast growth shown by *S. gigantea* in the Yalta region, Crimea (d. [b.h.?] 1 m. and height 35 m. at 50-60 years, a size reached by the local *Pinus nigra* var. *caramanica* only at 150-200 years) together with its strong soil-stabilizing root system, led to further trials. In autumn 1950 1-year-old seedlings raised in Moscow by VNIILH were planted in mixture with *Juglans regia* at 400 m. altitude on an area of 3 ha. The seedlings were put in groups arranged in chequerboard pattern at 5 m. intervals; groups of five 1 × 1 m. patches sunk 0.5 m. below ground level had one *S. gigantea* seedling per patch alternating with similar groups with two seedlings of *J. regia* per patch. *S. gigantea* withstood the 1950-51 winter well; the colouring of its foliage changed in the autumn to buff with a violet tint but became green again in spring 1951 when growth began. During the growing season they were cultivated thrice but watered only once in September, and put on 20-30 cm. height growth. In autumn 1951 survival was ca. 93%. The plants withstood the second winter well. Cross pollination has been done near Yalta in order to obtain the maximum of good seed for further plantings.

2855. ROBAK, H. Fremmede nåletreslag i Nord-Norge: inntrykk fra en inspeksjonsreise. [Exotic conifers in N. Norway: impressions from a tour of inspection.] *Tidsskr. Skogbr.* 63 (1), 1955 (4-16). [Nor.]

2856. PENO, D. Neki podaci o sastojinama ariša i belog bora podignutim veštačkim putem na Jelovoj Gori. [Some data on a Larch and a Scots Pine stand introduced artificially on Jelova Gora Mt. [Serbia].] *Šumarstvo* 7 (11/12), 1954 (626-31). [Serb.e.g.]

Both stands are described and some figures given of d.b.h. and height, by number of stems.

2857. MATSUI, Z., and YOKOYAMA, C. [On the growth of White Pine stands in Nopporo experimental forest.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (196-209). 12 refs. [Jap.e.]

Gives yield tables for 2 site classes for *Pinus strobus* (5-40 years) with supporting data. Nopporo has similar climatic conditions, vegetation and species to those of the Adirondacks, where this Pine has its natural range.

2858. SCOTT, C. W., *Radiata Pine in Chile*. *Unasylva* 8 (4), 1954 (159-64).

A short account of the plantations and wood properties of *Pinus radiata* in the Southern Hemisphere, with particular reference to Chile.

2859. SCOTT, C. W. Propriedades y usos del pino insignie. [Properties and uses of *Pinus radiata*.] *Chile maderero* 4 (5), 1954 (3...13). [Span.]

Cf. preceding abstract.

2860. [Tests of Slash Pine.] *Rep. Dir. For. Qd.* 1953/54, 1954 (11, 12).

In Queensland, Honduras Slash Pine (*Pinus caribaea*) has shown a consistent advantage in growth over U.S.A. Slash Pine (*P. elliottii* var. *elliottii*), and its use in routine plantings has been extended. *P. tropicalis* is making good growth in trial plots. *P. occidentalis* is not promising.

2861. ARIEF, O. S. M. *Pinus merkusii* (tusam) di sekitar Aek na Uli. [*P. merkusii* at and near Aek na Uli, N. Sumatra.] *Rimba Indonesia* 3 (11/12), 1954 (490-5). [Jav.e.]

An area of 5000 ha. at and near Aek na Uli, is planted with *P. merkusii*, ranging in age up to 25 years in 1953. Figures are tabulated, showing upper and mean height and mean diameter on sample plots with different spacings and trees ranging in age from 13 to 25 years. Spacings of 3 × 1.5 or 2 × 1.5 m. have proved much better than 3 × 4 or 4 × 4 m., but the wider spacings are suitable for mixtures with hardwoods. It is estimated on the basis of Ferguson's figures for growth and yield [see *For. Abstr.* 16 (No. 2062)] that the whole area will yield 945,000 cu.m./year, sufficient for a 40-ton paper mill. A further 262,500 cu.m. can be obtained from thinnings, on an unthinned area of 3500 ha. Difficulties encountered in large-scale cultivation are fires attributable to the thick litter layer which also hampers regeneration, and damage by *Milionia basalis*; after much research an attempt is being made to control the latter biologically.

2862. ARDIKUSUMA, R. I. Pertjobaan tanaman dalam kebun kayu asing dari balai penjelidikan kehutanan. [Planting experiments with exotic tree species in the gardens of the Forest Research Institute.] *Rimba Indonesia* 3 (11/12), 1954 (437-84). [Jav.e.] (Also as *Bijz. Publ. Bosbouwproefsta., Bogor* No. 8.)

Gives a list of all species (over 300) different provenances of which are grown in the 7 experimental gardens in different parts of Java, giving particulars of seed source, country of origin and results. The results are divided into 5 groups: failed, doubtful, acclimatized (growing well but fruiting poorly if at all), naturalized (fruiting normally) and domesticated (promising to be of economic value).

Exotics in the last group include some 50 species, and these are recommended for further trial in the forest. Green-manure species, species for under-planting, and species for reforestation where production forest is not the primary aim, are included. Tabulated data on the situation, soils and rainfall of the gardens are given. Tables and illustrations have English legends.

2863. [Introduced species.] *Rep. Dep. Agric. Seychelles* 1953, 1954 (10-2).

The following species, recently introduced or not until recently given a proper trial, are considered promising: *Cedrela mexicana*, *C. odorata*, *Swietenia mahagoni*, *S. macrophylla*, *Tectona grandis* and *Melia dubia*. A number of other species have been introduced for trial.

2864. CHAPUIS, J. Le mahogany et l'amélioration de la forêt martiniquaise. [Mahogany and the improvement of the forests of Martinique.] *Rev. for. franc.* 7 (2), 1955 (85-94 + 4 photos + 1 gph.). [F.]

Honduras Mahogany (*Swietenia macrophylla*) has been preferred to the native *S. mahagoni* for plantations in Martinique. There are some 465 ha. of these plantations, of various ages, and recent enumerations indicate that height m.a.i. is ca. 0.8 m. up to the age of 30, and girth m.a.i. ca. 5 cm. Planting density of 2400/ha. is recommended and shelter from wind is advisable.

2865. ONO, Y. [Eucalypts in Japan.] *Wood Ind., Tokyo* 9 (5), 1954 (210-2). [Jap.] P.R.

A short account of their introduction into Japan, with a sketch map showing their distribution. Details are given of the main plantations (1) in Fukuoka (Kyushu): *E. globulus*, spot sown at 30 × 30 cm. in 1936-37; now [1954] 292 trees, mean d.b.h. 6.8 cm., mean ht. 7.98 m., on 1.08 ha. (2) In Kochi (Shikoku): *E. globulus* and *E. rostrata*, 10,000 planted on 5 ha. in 1916; now 200 trees, mean d.b.h. 36 cm., mean ht. 14 m. (3) Shizuoka (Honshu): *E. globulus*, 150 planted on < ½ ha. in 1927; now 35 trees, mean d.b.h. 36 cm., mean ht. 13 m. (4) Shizuoka (Honshu): *E. globulus*, 50 planted in 1909; now 10 trees, d.b.h. 35-66 cm., ht. 16-27 m.

2866. BASSI, V. Les plantations d'*Eucalyptus* dans l'Italie méridionale et les îles. [Eucalyptus plantations in southern Italy and the islands.] [Docum.] *FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/SCM/EU/5*, 1954. pp. 3. [F.]

2867. PONTICELLI, P. Pioppicoltura meridionale. [Growing Poplar in the south.] *Cellulosa e Carta* 5 (11), 1954 (9-11). [It.f.e.]

Describes an experimental plantation of Poplar (clone I/214) in the province of Salerno, where Poplar has not hitherto been much planted. Particular emphasis is laid on the spacing (6 × 6 m.) which was much wider than usual in central and southern Italy (1.5 × 1.5 m.), staking, and cultivation of garden crops between the rows.

2868. IVAŠČENKO, A. I. Perspektivnyi vid klenna dlja lesokul'tur. [A promising species of Maple for forest plantations.] *Lesn. Hoz.* 5 (6), 1952 (42-4). [Russ.]

Recommends *Acer saccharinum* for planting as an auxiliary species in shelterbelts in central and southern Russia, since years of experience in Azerbaijan have shown that it withstands frost, drought, excessive soil moisture and heavy snowfall. It is frost-hardy at Leningrad, but bears no seed in the most northerly regions. In Azerbaijan it flowers early and by the end of May its seed is ripe; if sown immediately, it germinates in 12–15 days, and the seedlings will reach a height of 60 cm. and be ready for planting out in the same year. It grows much faster in youth than some other Maples. The respective heights of 20-year-old trees grown under similar conditions were: *A. saccharinum* 12 m.; *A. insigne* 9.5 m.; *A. platanoides* 6.5 m.; *A. campestre* 5.5 m.

2869. LEBEDENKO, L. A. Razvedenie kamennogo duba na Apšerone. [Cultivation of *Quercus ilex* on the Apsheron peninsula.] *Lesn. Hoz.* 5 (7), 1952 (19–20). [Russ.]

Trials of direct sowings of *Q. ilex* in 1950, in the neighbourhood of Baku (N. slope, clayey soil of poor structure), showed the possibility of raising it without watering under semi-desert conditions. Planting out of 1-year seedlings failed completely. Before sowing, the ground was prepared by digging contour trenches 60–70 cm. deep, 70–80 cm. wide and 2 m. apart [down the slope?] with a 20 cm. ridge along their outer edge. The best method of sowing was in 'nests' (6 acorns per 'nest', 6–8 cm. deep) with a 2–3 cm. mulch of 'gumbrin'—a clayey waste product of the oil industry, containing 40% of organic and 60% of mineral substances, with some fertilizing value, first suggested by D. M. Guseinov; as a mulch, this has proved a more effective moisture conserver than manure. A definite rhythm has been observed in the growth of the Oak, closely related to climate and especially marked in the first growing season. The seedlings grow steadily from mid-April to mid-July (mean day temperature 20–23°C.) and reach a height of 12–13 cm.; thereafter their rate of growth slows down (increment $\approx$ 1.5–2 cm.), ceasing altogether from the end of July till mid-Aug., when temperatures reach 37–40°; in later Aug., when it becomes cooler, growth is resumed and continues up to mid-Nov., though at a reduced rate (spring-summer increment 13–15 cm.; autumn 3–4 cm.). Early (March) sowing is important, so as to give time for the roots to penetrate 1 m. deep into the soil and withstand the July–Aug. drought. Large acorns are best, germinating quicker and giving a better root system. Considerable losses have been caused by a disease characterized by withering of the leaves from the top downwards, rotting of the main roots, and the presence of sclerotia—small dark nodules—on the roots.

2870. BARANOV, N. JA. Razvedenie tehničeskikh kul'tur v Vinnickoi oblasti. [Cultivation of economic crops in the Vinnitsa region.] *Lesn. Hoz.* 5 (7), 1952 (83–4). [Russ.]

Special attention is being given in the Vinnitsa region to the cultivation of plants yielding gutta-percha. *Euonymus europaeus*, which grows faster and has proved immune to cockchafer grubs, is

preferred to *E. verrucosus* (respective yields of dry bark, 300 kg. and 150 kg. per bush in 1936 local plantations, though the latter has a somewhat higher gutta-percha content). In nurseries *E. europaeus* is sown (1) in September (with or without the husk) immediately after seed collection, (2) late in autumn or in spring (in both cases after stratification), all of these methods giving good results. In spring 1951 direct sowings with stratified seed, made in several forests on ca. 200 ha., in plantations and in [natural?] stands of low density, proved successful.

In the Kryzhopol leskhov *Eucommia ulmoides* has been raised both by direct sowing and by planting. *Phellodendron amurense* and other exotics have been used as admixtures in the conversion of poor Hornbeam stands to Oak.

2871. VERTEPNYI, I. I. Vyrashčivanie evkommii na Ukrainie. [Cultivation of *Eucommia ulmoides* in the Ukraine.] *Lesn. Hoz.* 5 (7), 1952 (82). [Russ.]

[Cf. *For. Abstr.* 16 (No. 1607).] Unstratified seed sown in May 1947 in a cold frame, at the Kiev Forestry Institute, began to sprout only after 6 weeks. By autumn the seedlings were 3–5 cm. high; for the winter a few were transplanted to pots and the rest covered with dry leaves. The latter all died, but 2 of the potted plants survived and were planted out in the open in spring 1948, each producing two 40-cm. shoots. In the winter, in spite of being wrapped in straw, these were killed back to snow level. Next summer the plants produced four or five 1-m. shoots, which were again partly killed by frost. By 1951 they had 7–9 shoots, 0.9–1.3 m. high. Repeated frost killing and coppicing means that in the Ukraine this species will only form a bush. Before sowing, *Eucommia* seed needs to be stratified for $1\frac{1}{2}$ –2 months at 10–12°C., then sown in fresh, fertile soil, and covered with straw. For winter the seedlings are lifted and stored in cellars in moist sand; in the spring they are planted out.

2872. SMIRNOV, N. A. Vyrashčivanie evkommii v Novorossiiskom leskhov. [Cultivation of *Eucommia ulmoides* in the Novorossiisk leskhov.] *Lesn. Hoz.* 5 (7), 1952 (85). [Russ.]

Note on a small trial planting (1-year-old seedlings on heavy clay-loam; fluctuating water table) on the Black Sea coast, which, despite the extreme climate and lack of shelter, reached 0.86–1.91 m. in height in 3 years, as a dense bush.

232.12. Races and Provenance Trials

See also Nos. 2738, 2783–4.

2873. JENTSCH, J. *Pinus murrayana* (Balf); *P. contorta* var. *murrayana* (Engelm.); *P. latifolia* (Engelm.). I. Teil. Ein Anbauversuch im mitteldeutschen Raum. II. Teil. Ein Provenienz-anbauversuch. [Lodgepole Pine: I. Trials in Central Germany. II. Provenance trials.] *Arch. Forstw.* 3 (3/4; 5/6), 1954 (288–352; 518–52). 23 refs. [G.]

Part I makes a detailed comparison of the first 20 years' growth and other biological reactions of Lodgepole of Sundra (Alberta) provenance and Scots Pine of various provenances in paired plots in 16 fully described sites of 12 localities, representative of a full range of conditions in Saxony. The

climates are compared with those of Banff and Calgary within the natural range of Lodgepole. For each species and site the data include diam. at breast and mid-height, total height, form quotient, leader growth, and distribution of crown classes. It is concluded that Lodgepole is not superior in stem volume production to Scots Pine, but that this is offset in short rotations by its ability to grow in denser stands. It has advantages in stem and crown form, heavy leaf fall, and resistance to drought, snow breakage, frost, and leafcast disease; also great powers of recovery from insect damage (*Rhyacionia*) at the cost of form but not of volume (pulpwood). It suffers considerably from game. Its adoption should depend on its special capacity e.g. to produce pulpwood on sites where Spruce would be inferior, as a substitute for Scots Pine at the latter's upper altitude limit, as a pioneer in afforestation of waste land, for filling blanks in group selection etc. Its natural associates, *Abies grandis* and *Populus deltoides* (both good pulpwoods), are proposed for mixtures with it.

Part 2 describes the first 20 years' growth and biological reactions of *P. contorta* of the following provenances: (1) Washington, maritime, locality unknown; (2) and (5) (temperate intermediate), British Columbia, Kamloops and Salmon Arm; (3) mountain climate, California, Mt. Shasta; continental and highland—(4) Cypress Hills, Saskatchewan, and (6) Peace River, Alberta. The climates of all the localities concerned are described in detail. The provenance plots are arranged in order of excellence according to the following criteria separately: survival of first planting (at 10,000/ha) height growth (correlated with length of the provenances' growing seasons), diam. at breast- and mid-height, form quotient, height, d.b.h., bark thickness and %, ability to grow in dense stands, short branching and branch angle, growth form based on defect counts, length and breadth of needle. Under the conditions of the time (1928-41) and place (Tharandt Instructional Forest), probably not exactly reproducible, the average order of excellence of the provenances was 2, 4, 3, 5, 6, 1. To choose a provenance for other sites and purposes special factors would have to be considered, e.g. length of growing season. Lodgepole (except in No. 1 which was conspicuously poor) lived up to its reputation for resistance to snow damage, which was well tested. *Rhyacionia buoliana* and *R. resinella* infested 82-98% of the trees but if this is confined, as suggested for Scots Pine, to the first 12 or 30 years of life, the species, with its conspicuous regenerative powers (including the straightening of the main stem), should provide an adequate stocking for older stands. Details of leaf colour and persistence, of the morphology of buds and cones, and of the earliness and abundance of cone production are included. There is a full discussion of the climatic races and suggestions for further research. [Cf. *For. Abstr.* 15 (pp. 389-96); 16 (pp. 3-13).]

2874. BØRSET, O. Raseforedling av skogstrær i Finnland: et besøk på Klemetskog. [Breeding forest trees in Finland: a visit to Klemetskog.] *Tidsskr. Skogbr.* 63 (2), 1955 (47-53). [Nor.]

Describes breeding experiments on Birch, Pine and Spruce, and provenance trials of exotic conifers at an experimental forest 20-30 km. from Helsinki.

232.13. Trials of Hybrids and Other Products of Tree Breeding

2875. BELLON, S. Wyniki dotychczasowych obserwacji nad wzrostem mieszańca modrzewia *Larix eurolepis* (*Larix leptolepis* × *Larix europaea*) na terenie lasów doświadczalnych SGGW w Rogowie. [Results of observations on the growth of *L. eurolepis* (*L. leptolepis* × *L. decidua*) in the Rogów experimental forests of the Agricultural University of Warsaw.] *Sylwan* 98 (4), 1954 (294-9). 5 refs. [Pol.]

One-year seedlings of nursery-grown *L. eurolepis* (seed from Dunkeld, Scotland), and *L. polonica* were planted in 1950, and their growth rates compared in 1951-3. The hybrid showed a greater height increment, although the relative increment seems to decrease more rapidly than for *L. polonica*. The hybrid is fairly resistant to low temperatures, and no fungal attack has been observed.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 2593, 2869, 2972, 3108.

2876. MEADE, F. M. Growth and survival of Shortleaf Pine and Eastern Redcedar in North Arkansas. *Arkansas Farm Research, Fayetteville* 3 (2), 1954 ([4]). H.S.B.

Comparative plantations of *Pinus echinata* and *Juniperus virginiana* were established on an abandoned field at the Livestock and Forestry Branch Station, Batesville, in 1948. On half the plots, competing vegetation was removed from an area 2 ft. square round the transplant; on the other half, it was not. One-year-old stock was used, at 6 × 6 ft. Survival in both species was much better on prepared plots, but there was no appreciable difference in height growth under the two treatments. Average height of the Pine at the end of the third season was ca. 2½ times that of the Cedar, and it is therefore much better able to compete with coppicing hardwoods. The Pine also survived a fire in 1950 which killed the Cedar.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. Seed

See also Nos. 2844-5, 3031.

2877. ŠNAJPERK, R. Lesní semenářství. [Forest seed manual.] *Lesn. knihovna (malá řada)* No. 36, 1954. pp. 332 + [3] + 1 dgm. + 1 tbl. 38 refs. [Cz.] Price Kčs. 23.30.

An illustrated manual, including the following sections: collection of seeds and fruits; the main seasons of forest seed collection for 77 forest species (main indigenous and imported species, special attention being paid to native Oaks and Larch); cleaning and hulling of seeds; purity and germination tests; viability; storage and stratification.

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 2771-4, 2853, 2933-4.

2878. RUMMUKAINEN, U. Männyn ja kuusen käpysadosta ja sen arvioinnista vuosina 1950-1953. [Cone production of Scots Pine and Norway Spruce in Finland 1950-53, and procedure for estimating it.] *Acta for. fenn.* 61 (20), 1954. pp. 20. 14 refs. [Fig.]

Estimation is by marking 10 dominant trees inside sample stands, the trees being chosen so that the south side of their crowns is visible at a distance of 10 m. The surveyor then takes his stand to the south of a selected tree at a distance not less than the height of the tree and, without moving from the spot, counts all the visible mature cones of the year, and enters them on a tally sheet, pursuing the same routine for the other marked trees. The resulting data is later analysed and classified in 6 categories (no cones, very few, rather few, medium, rather plentiful, plentiful). Counting is best done in sunlight with the aid of binoculars.

2879. STARČENKO, I. I. Osobennosti vegetacii i plodonosenija duba čereščatogo v privolžskih dubravah. [Features of the vegetation and fruiting of *Quercus robur* in the Oak forests of the [Upper] Volga.] *Lesn. Hoz.* 5 (7), 1952 (48-50). [Russ.]

Observations on flowering and the early stages of acorn formation in 1950 and 1951 showed that these could not furnish sufficient indications for planning seed collection in the Tatar and Chuvash Republics.

2880. OZAWA, J. [Experiment on fruit promotion in Japanese Larch (preliminary report)—On the growth of the twig (spur shoot) and the insertion [development] of winter buds.] *Spec. Rep. For. Exp. Sta., Hokkaido.* No. 2, 1954 (44-9). 4 refs. [Jap. jap.e.]

[Active?] spur shoots were most abundant on the current year's wood. Numbers of [flower?] buds and numbers of spur shoots were closely correlated. Strong growth in the current year's long shoot was accompanied by the setting of very few flower buds. This was strikingly evident in the plot without P. Plots not given P or K set few flower buds. Those fertilized with P or K only and the plot from which N was withheld flowered abundantly. *From author's summary.*

2881. SAX, K., and JOHNSON, A. G. Induction of early flowering of ornamental Apple trees. *J. Arnold Arbor.* 36 (1), 1955 (110-4). 6 refs.

Five buds each from a fruiting apomictic tree and from its young seedlings were budded on clonal dwarfing stocks in 1951. Of the 5 trees from 'old' buds, one flowered in 1953 and all in 1954. None of the 5 trees from 'young' buds have yet flowered. The evidence suggests the presence of a flower-stimulating substance in the fruiting tree which is absent in its apomictic seedlings. *From authors' summary.*

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 2901, 2912, 3070.

2882. Hoop Pine [*Araucaria cunninghamii*]. *Rep. Dir. For. Qd.* 1953/54, 1954 (12).

Browning of cones, long accepted as the criterion of seed ripeness, is not really satisfactory. Observations were made on cone density and on the developing embryo. Variation in cone density over the critical period was so slight that it would afford no practical aid, but it was found that the embryo develops rapidly from mid-November and that when the embryos, generally, are full grown and mature in appearance, collection is safe.

Long-term thinning experiments have already established the intensity of first thinnings: the stand should be reduced to 350 stems/acre when the predominant height averages ca. 50 ft. (at 13-15 years). Data are accumulating which indicate that a second thinning is desirable to about 270 stems/acre when the predominant height averages ca. 70 ft. (at 19-20 years).

2883. [Seed research.] *Rep. For. Dep. Trin. Tob.* 1953, 1954 (16).

If Mahogany [*Swietenia* spp.] capsules are collected before opening, and dried in the sun, 95% germination can be obtained provided that the seed is well sunned after extraction. *Cedrela mexicana* seed stored for 76 weeks in a desiccator at normal temperature gave 60% germination, and similar seed stored for the same period in a refrigerator gave 70%.

2884. LANQUIST, K. B. Seed cleaning and de-winging machine. *Tree Plant. Notes* No. 18, 1954 (8-9). [Mt. Shasta Nursery, U.S. Forest Service.]

An illustrated description of a machine adapted from the 'Dustless Hammer Mill' designed by the Soil Conservation Service.

232.315. Seed Storage and Treatment

See also Nos. 2738, 2883, 2912.

2885. ŽURAVLEV, I. I. Novyj sposob dezinfekcii semjan. [New method of disinfecting seed.] *Lesn. Hoz.* 5 (7), 1952 (52-4). [Russ.]

The usual method of disinfection against *Fusarium*, by soaking seed in fungicide solutions, needs care, as some fungicides are toxic to man, and excessive soaking periods or concentrations may affect germination. The new 'hydro-mechanical' method of removing the spores by washing with water has none of these drawbacks; 3 alternative procedures are detailed: (1) The water-jet procedure requires a hand or mechanical sprayer working at a pressure of 2 atm., and a vessel with a hole at the bottom covered on the inside with a fine wire mesh and fitted on the outside with a cork or tap. The vessel should be large enough for the seed to be spread in a layer 15 mm. thick (for 1 litre of seed the bottom area should be 660 sq. cm.). The seed is first soaked for 20 min. with an equal volume of water, which is then drained off and replaced by the same volume of fresh water. It is then agitated by water jets (not shorter than 500 mm.) from the sprayer until the latter has passed 1 litre of water; the water is then drained off, the operation repeated, and the treated seed dried and stored or stratified. Alternatively, after soaking, the seed can be placed on a sieve for spraying. (2) The air-jet procedure

uses the same equipment, differing from (1) in that the seed, after soaking, is agitated in twice its volume of water by air jets from a sprayer under 2 atm. pressure; this operation is repeated 3 times, after which the water is drained off and the seed rinsed. (3) The 'friction' procedure is very simple: the seed is soaked for 30 min. with an equal volume of water in a container which is then shaken for 2 min.; the water is changed and the container left standing for 10 min., when it is again shaken for 2 min. This operation is repeated twice and the seed is then poured on to a sieve to drain. For 1 litre of seed (1) requires 4-6 litres of water and takes 30 min.; (2) 4 litres and 40 min.; and (3) 6 litres and 90 min. The method can be used for disinfecting large seeds, e.g. of Maple, Ash etc., but only when there are no spots on their wings, which would indicate that hyphae had penetrated into the tissues of the wings and would call for the use of fungicides. The treated seed is said to be free from spores of damping-off fungi, and it is claimed that by using 25% more water, or raising the jet pressure to 4-5 atm., the residual spores of saprophytic fungi such as *Penicillium* and *Mucor* can be completely removed.

2886. LAVENDER, D. P. Douglas Fir seed germination after exposure to varying temperatures and humidities. *Res. Note Ore. Bd. For.* No. 18, 1954. pp. 3.

The humidities, temperatures, and times of exposure necessary to reduce significantly the germinative capacity of Douglas Fir seed after removal from cold storage do not occur during the normal handling of seed in artificial regeneration work.

2887. BARTON, L. V. Effect of sub-freezing temperatures on viability of conifer seeds in storage. *Contr. Boyce Thompson Inst.* 18 (1), 1954 (21-4). 3 refs.

Seeds of *Pinus ponderosa*, *Pseudotsuga taxifolia*, *Picea sitchensis*, *Thuja plicata* and *Tsuga heterophylla* were stored in canvas bags at temperatures of ca. -4° , -11° , and -18° C. for 3 years. It was found that -18° was best for preserving viability and that deterioration was most rapid at -4° .

2888. BARTON, L. V. Storage and packaging of seeds of Douglas Fir and Western Hemlock. *Contr. Boyce Thompson Inst.* 18 (1), 1954 (25-37). 7 refs.

Data are given on the effect of different moisture contents of the seeds of Douglas Fir and Western Hemlock on their viability when stored at 5° and -18° C., and on the keeping quality of such stored seeds when packeted and kept for a further storage period of 5° or 30° . With moisture contents (m.c.) of 5.8 or 13.6% in sealed storage at -18° , and with 5.8% m.c. at 5° , full viability of Douglas seeds was retained for a period of 3 years. Similar effects were found for Hemlock seeds with 7.7 and 11.0% m.c. Douglas seeds in open storage at 5° and -18° , and in sealed storage with 13.6% m.c. at 5° , showed deterioration after 12 months, with the last named showing more marked deterioration than the other two after 24 months of storage. Open storage at 5° was more deleterious for Hemlock seeds than for those of Douglas.

Sealed tin cans were best for packeting when the moisture content of the seeds was low, but not as good as manila envelopes for high-moisture seeds. Storage for as long as 24 months at -18° , had no harmful effects on seeds when they were packeted and held subsequently for six months. Deterioration in packets was more rapid at 30° than at 5° , and for seeds with high m.c. than for those with low. Vinyl-laminated aluminium foil was effective for packeting seeds with low m.c. to be stored at either 5° or 30° , but caused rapid deterioration of seeds with high m.c. when the storage was at 30° . Seeds of both Douglas and Hemlock stored for an extended time at -18° , were more resistant to further unfavourable storage than those stored at 5° , because of the higher germination capacity of the former. *From author's summary.*

2889. PALMER, S. R. A comparative experiment in the storage of acorns of *Quercus pedunculata* and *Q. sessiliflora* under water. *J. Oxf. Univ. For. Soc. (Ser. 4)* No. 3, 1955 (14-25). 14 refs.

Acorns from 5 trees of each species were stored (1) in a basic river, (2) in a small tank, water changed regularly, or (3) in a similar tank, water left unchanged. Acorns in the 'stagnant' tank failed to germinate, those in the fresh tank kept better than those in the river, the latter being damaged more by micro-organic infection and by the current. The degree of germination at collection was found to have a profound effect on viability, especially with the Sessile Oak. Practically without exception the germination of the Sessile acorns was poor while the Pedunculate acorns germinated freely. The poor viability of the former would preclude their being stored under water but results from the latter were as good as, or better than, those to be expected from normal storage methods. *From author's summary.*

2890. LOTOCKIJ, I. S. Hranenie želuđej v USSR v proizvodstvennyh uslovijah. [Acorn storage in the Ukrainian S.S.R.] *Lesn. Hoz.* 5 (7), 1952 (50-2). [Russ.]

Describes a method of storing by mixing a 2- to 3-cm. layer of acorns with a 5- to 6-cm. layer of moist sand, watering to saturation, and adding further layers in trenches 3 m. deep, leaving the top 1.3-1.5 m. to be filled with moist sand only and then adding 10 cm. of Pine needles surmounted by a mound of sand ca. 0.75 m. high. In several forest districts of the Ukrainian SSR acorns so stored kept sound for 2 years. [Cf. *For. Abstr.* 13 (No. 2920).]

2891. GUDCEV, I. I., and ROMANOV, D. V. Predposėvnaia obrabotka semjan sosny obyknovnoĭ metodom jarovizacii. [Vernalization as a method of pretreating seed of *Pinus sylvestris*.] *Lesn. Hoz.* 5 (5), 1952 (73). [Russ.]

Seeds were first soaked in water for 9 days at room temperature, by which time 40% had emergent radicles; then put into bags and kept for 30 days on ice at $+1-2^{\circ}$ C. in clay vessels allowing free access of air, in a semi-dark cellar. At sowing time 40% of the stratified seed had radicles up to 1 mm. long. Compared with controls that were only soaked for 9 days, this seed germinated 10 days earlier and

more uniformly, showed 3-7 times the plant% (25 October) and developed into stronger plants.

2892. JIROTKA, J. Stratifikace habru a lípy. [Stratification of Hornbeam and Lime seed.] *Lesn. Práce* 33 (11), 1954 (519-20). [Cz.]

Ca. 1000 kg. of *Carpinus betulus* seed and ca. 3000 kg. of *Tilia* sp. (*platyphyllos* and/or *cordata*) were gathered by the author in Nov. 1953, de-winged, graded by flotation and [cold?] soaked for a few days. The moist seed was mixed with sand and put in boxes in a cowshed in mid-January. The temperature of the shed seldom fell below 5° C. The seed was aired by turning fortnightly (air humidity being maintained by the cows' breathing) and moistened with water of 30-40° C. It began to germinate about 20 March.

2893. COGGESHALL, R. G. Propagating some rarer plants from seed. *Trees, Cleveland, Ohio* 14 (3), 1954 (9, 21). 1 ref.

Includes some data on the stratification periods for *Acer*, *Carpinus* and *Sorbus* spp. used at the Arnold Arboretum.

2894. NYHOLM, I. Spiringsundersøgelser af tjørn, *Crataegus monogyna*, Jacq. af dansk og italiensk avl. [Investigations on the germination of *C. monogyna* of Danish and Italian origin.] *Tidskrift for Planteavl, København* 56 (4), 1953 (684-701). 7 refs. [Dan.dan.e.] L.S.

Recommendations are made for stratification when seeds can be stratified at controlled temperatures, for soaking and stratification when temperatures cannot be controlled and for treatment with H_2SO_4 to reduce the period of stratification. Slightly different treatments are recommended for seeds from the two sources.

2895. OZAWA, J., and MATSUURA, T. [Studies on the hard seeds of Leguminous trees (V). Comparison of species and home [? provenance] as regards hard seeds, resulting from difference of treatment.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (50-8). 15 refs. [Jap.jap.e.]

The effects of steaming, soaking in boiling, tepid and cold water, and in conc. H_2SO_4 ($\frac{1}{2}$, 2 and 3 hours) in raising or depressing the germinative capacity of *Cytisus scoparius* and *Robinia pseudoacacia* are described, with tables and graphs. Steaming for 1 minute proved best for *Cytisus*, $\frac{1}{2}$ hour soaking in H_2SO_4 for *Robinia*.

2896. WATANABE, S. [Hastening the germination and the absorption of water by seeds of *Acacia mollissima*.] *J. Jap. For. Soc.* 36 (11), 1954 (327-30). 2 refs. [Jap.jap.e.]

All treatments tried—boiling water, dry heating at 100° C., H_2SO_4 soak (all for 10 min.) and scarifying—proved effective, the scarifying most of all but causing much injury and decay. Water absorption rates were also studied, in terms of both weight and volume increase. Data are tabulated and graphed.

2897. OZAWA, J., and MATSUURA, T. [Studies on the physiology of germination in tree seeds (II). The difference of effect by storage with compounds seed species [i.e. The effect of some organic compounds on stored seed].] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (32-43). 5 refs. [Jap.e.]

Details, in histograms and tables, the effects, according to species, chemical, and dosage, of the organic mercurials used in seed sterilization (Mercuron, Riogen, Luveron, Uspulun, Ceresan), on the germination of Todo Fir (*Abies mayriana*), Ezo Spruce (*Picea jezoensis*) and Japanese Larch (*Larix leptolepis*). Seed was collected in 1951, stored at 0-5° C. and treated with 0.2, 1.0 and 5.0% of its weight with the chemical. Germination in 1952 and 1953 is detailed.

232.318. Seed Testing. Germination Tests. Seed Quality

2898. SCHUBERT, J. Bemerkungen zur Saatgutbeurteilung für die forstliche Praxis. [Notes on the certification of forest seed.] *Wald* 2 (6), 1952 (172-7). 7 refs. [G.]

The article, inspired by the Forest Department of the D.D.R. details the main requirements, under the Ordinance of 1.3.52, for the testing of forest seed, as regards sampling, purity tests, germination tests, determination of 1000-seed weight etc., including a test report form.

2899. ILJIN, A. I. Vlijanie veličiny semjan sosny na ih kačestvo. [Influence of the size of Scots Pine seeds on their quality.] *Lesn. Hoz.* 5 (7), 1952 (54-5). [Russ.]

Tests in a Liebenberg germinator failed to establish a relationship between seed weight and germinative capacity and energy.

2900. ISHIKAWA, S., and SHIMOGAWARA, G. [Effects of light upon the germination of forest tree seeds. I. Light-sensitivity and its degree.] *J. Jap. For. Soc.* 36 (11), 1954 (318-23). 16 refs. [Jap.e.]

Graphs with English captions show the germination % for 1, 10, 100 min. or 24 hours' exposure to 1000 lux and for 1-15 days' pre-soaking [in water?] of *Alnus firma*, *Chamaecyparis obtusa*, *Pinus thunbergii* and *Paulownia tomentosa*.

232.32. Plant Rearing. Nursery Practice

See also Nos. 2844-5.

2901. HEIKINHEIMO, O. Taimitarhan maantieteellinen sijainti, siemenen alkuperä ja istutuskaudet. [The location of nurseries, collection of seed, and season of sowing.] *Acta for. fenn.* 61 (9), 1954. pp. 28. 15 refs. [F.g.]

Gives comparative data from Germany, Finland, Norway, Sweden, U.S.S.R., France and Italy, for dates of seed collection, seed weight, sowing season, beginning and end of growing season, mainly for Scots Pine. Legends to tables are in German as well as Finnish.

232.321. Nursery Sites, including Factors affecting Selection of Sites for Nurseries

2902. KRAUSS, H.-H. Pflanzenbedarfs- und Kampfflächenplanung. [The planning of plant requirements and nursery areas.] *Wald* 2 (4), 1952 (120-3). [G.]

Instructions (with one sample form) for ascertaining (seed and) plant requirements, and hence nursery space, in relation to the greater and more varied demands resulting from the new principles of

management, involving extensive regeneration of clear felling, underplanting, advance planting, and the use of mixtures in E. Germany.

2903. BELITZ, G. Zur Sommer- und Herbstpflanzung unterjähriger Kiefern sämlinge in der Methode Specht. [Summer and autumn planting of Scots Pine seedlings under one years old by the Specht method.] *Arch. Forstw.* 3 (3/4), 1954 (274-87). 12 refs. [G.]

In the Specht method, concentrated sowings are made in the spring on $\frac{1}{3}$ of the plantation area and the superfluous seedlings when still < 1 year old are used to plant up the remaining $\frac{2}{3}$, in rainy weather, in the same summer and autumn, when the ground is well soaked. The short distance allows batches to be planted in as little as 45 min. from lifting. Beating up can be done in the following spring with 1-year seedlings, or the spring planting can be beaten up that same July, Aug. or Oct.-Nov. with seedlings < 1 year old. The latter show a distinct benefit from being able to make full use of the early spring growth season. The author presents a statistical comparison of the results of direct sowings in the spring with field planting of surplus plants of this sowing in the same summer and autumn and the following spring, and of planting in the same summer and autumn of plants < 1 year old with planting 1-year plants in the following spring. With height growth as a criterion, statistically significant results show the value of the summer and particularly of the autumn planting.

2904. MILDNER, H. Zu 'Aufforsten ohne Kampf' (Methode Specht). [On 'plantations without nurseries' (Specht's method).] *Wald* 2 (3), 1952 (86-7). [G.]

Deals with problems of cost reduction in artificial regeneration, in connexion with articles by F. Specht and H. Krauss, putting for ward the view that with suitable modifications based on local knowledge, especially of the locally varying habits of deer, the method could be extended to other regions and species, and quoting a similar, independent experiment with Norway Spruce in the Thüringer Wald. Money for the maintenance of nurseries in 'model' condition and for the production of large transplants is not necessarily well spent. When older plants are required—e.g. for the higher altitudes in the Thüringer Wald—undercutting by spade can be substituted for transplanting, excess seedlings being lifted and used and the remainder left to grow on at suitable spacing until they are large enough. Spruce must be undercut on both sides, Oak (taprooted) only on one. Undercutting saves root pruning of the lifted seedlings.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 2996, 3491, 3596.

2905. UCHIDA, T., and TSUDA, K. [Studies on phosphate manure. I. Amounts of calcium influencing increase of available phosphate fertilizer.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (7-12). 9 refs. [Jap.e.]

Ca deficiency in the acid soil of the Sunagawa nursery was harmful to the growth of Larch seedlings. This deficiency exerted more influence on the

first year's top growth than a deficiency of P, but the reverse was true in the second year. Increasing the proportion of Ca had less effect on *Todo* [*Abies mayriana*?] than increasing P, the availability of the latter being reduced by combination with Ca when this is applied heavily. *From authors' summary.*

2906. UCHIDA, T., and TSUDA, K. [Manure examination for *Larix* (III). Examination of availability [effect] of some manure.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (13-7). [Jap.e.]

The effects of 13 kinds of N and 8 kinds of P fertilizers on *Larix leptolepis* grown from seed in pots are given in tables and histograms, in terms of leaf, shoot and root weight. Urea, fish manure and compost gave best development at one nursery; soya bean cake and basic slag at another.

2907. BJÖRKNAN, E. Betydelsen av gödsling i skogsträdsplantaskolor för plantornas första utveckling i skogsmarken. [The importance of fertilizers in forest nurseries for the early development of plants on forest sites.] *Norrlands Skogsvärb. Tidskr.* 1954 (4), (543-66). 12 refs. [Sw.]

In 1947 Scots Pine and Norway Spruce were sown on plots previously given different fertilizer treatments at (1) Kulbäcksliden, Västerbotten (a forest site rich in minerals but poor in N), (2) Sörgidsjö, Ångermanland (an old agricultural site rich in both minerals and N), (3) Mörkhult, Halland (heathland, poor in minerals and N), and (4) Knäred, Halland (poor in minerals and fairly rich in N). Of the fertilizer treatments given, only the results of adding N, P, or K separately or all together are reported here; measurements on seedlings (mean dry weight of shoot and root based on at least 300-400 seedlings for each treatment and nursery) are given in graphs. At (1), addition of N and NPK gave increased weights, while addition of K or P had no noticeable effect. At (2), addition of N, P or, for Pine only, NPK gave lower weights than in the untreated controls. At (3) and (4) N, P, or K alone had no effect but NPK gave much higher weights; plants at (3) were smaller than those at (4). Chemical analyses of the plants showed increases in the element added as fertilizer. The 2 + 0 or 3 + 0 plants were planted out on different sites in 1949-50 and inspected in 1951-52. Graphs are given showing height at planting out, which gave a reasonably good correlation with dry weight, and height at inspection. Plants from (2) generally developed better than those from (1), but the plants from the N-fertilized plots at (1) showed an increase and those from (2) generally a decrease in growth. There were considerable variations in plants from the same nursery, according to the planting-out site, e.g. Pine from N-treated plots showed better growth on moraine than on silt, and on burnt than on corresponding unburnt sites. Differences between Spruce were less noticeable. The later development of seedlings from (2) given heavy fertilizer treatments showed little or no improvement over the controls, presumably because the agricultural soil already contained sufficient nutrients. Of plants from (3), especially Spruce planted out on heathland, only those given NPK treatment and heavily limed in the nursery developed satisfactorily.

None of the treated plants from (4) showed very much improvement over untreated controls, when planted out on heathland. The importance of maintaining or creating well-balanced fertilizer conditions and the value of transplanting on to a site similar in nutritional properties to the nursery site are emphasized. On the whole, forest sites are preferable to agricultural sites for nurseries because of the danger of excessive and one-sided use of fertilizers and the greater cost of weeding on the latter. Experiments by Mo och Domsjö AB since 1947 have shown that good plants of Pine and Spruce can be grown in nurseries on pure sandy 'Pine heath' sites suitably fertilized but that, as the fertilizer is used or leached out after one growth period, the required amount of fertilizer should be added annually; adequate watering is also essential.

2908. VERBICKIĭ, A. JA. Vlijanie menilitovykh slancev na razvitiie sejanec duba. [Effect of menilitic schists on the development of Oak seedlings.] *Lesn. Hoz.* 5 (5), 1952 (42). [Russ.]

Treatment of seedbeds in a nursery of the Lwów leskhoz with ground menilitic schists (500 kg./ha.) considerably improved the growth rate of Oak seedlings in their first growing season [figures are given]. The schist was put at the bottom of the drills, lightly mixed with the soil, and the acorns sown 4 cm. deep; all seedlings grown with the schist developed characteristically compact root systems.

2909. TUJI, T., and WATANABE, S. [A comparative study on mechanical and manual operation in ploughing and furrowing a nursery.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 74, 1954 (191-204). 8 refs. [Jap.jap.]

232.323. Sowing and Covering

See also Nos. 2775, 2870-1, 2901, 2920.

2910. MIKOLA, P. Kylvötyö taimitarhoissa. [Sowing in forest nurseries.] *Metsät. Aikak.* 1954 (12), (479-80, 492). 4 refs. [Fie.] (*Metsätietoa, Helsinki* 1954 (2).)

Some results of a survey in 1954 of Finnish nursery practice show that sowing is mostly done by hand in longitudinal furrows 10-14 cm. apart. Best results are obtained if the bottom of the furrow is smoothed and compacted and the seed is lightly covered with sand. Amounts of [Scots] Pine and [Norway] Spruce seed used ranged from 1 to 5 kg./acre. *From author's summary.*

2911. BARAŃSKI, S. Hodowla sadzonek osiki w szkółce podsiakowej [podciekowej]. [Rearing Aspen plants in an irrigated nursery.] *Las polski, [Warszawa]* 28 (5), 1954 (10-2). [Pol.] *From abstr. in Prehl. lesn. Lit.* 5 (9), 1954 (No. 3541). [Cz.] P.R.

An irrigated nursery is suitable for rearing Aspen seedlings. Sowing should take place not later than very early in June; density of sowing should not exceed 100/linear metre. Shades have a favourable effect if they are not more than 50-60 cm. above the beds. The dense crop is finally reduced to ca. 40 seedlings/metre.

2912. BILLIK, R. Moje doświadczenia z zakresu pozyskiwania nasion i hodowli sadzonek osiki.

[My experience in harvesting the seed and rearing plants of *Populus tremula*.] *Las polski, [Warszawa]* 28 (5), 1954 (1-10). [Pol.] 10 photos. *From abstr. in Prehl. lesn. Lit.* 5 (9), 1954 (No. 3560). [Cz.] P.R.

Harvesting should begin when the catkins start to burst and cotton appears. The seed is separated by rubbing between the hands, and screening. Seed is pre-dried for 4 days in layers 1-2 cm. thick at room temperature, and stored in a cool cellar. Aspen nurseries should preferably have a level surface and a moderately moist sandy-loam soil. Before sowing, the soil is ploughed, sterilized, manured and watered. Seed is sown by hand in drills at 0.5-1 cm. spacing. The beds are well watered for several days after sowing. The author recommends shading during the first 2-2½ weeks.

2913. KOLESNIČENKO, M. V. Vlijanie različnoi gustoty poseva želudel na rost odnoletok duba. [Influence of varying density of sowing upon the growth of first-year Oak seedlings.] *Dokl. Akad. Nauk SSSR* 96 (1), 1954 (201-3). 2 refs. [Russ.] A.P.B.

In April 1953, in a nursery of the Voronezh Agricultural Institute, replicated sowings of *Quercus robur* were made, using 'pre-germinated' seed, on beds 1 m. wide: (1) with 5 drills per sq. m. and (2) with a quincunx of 5 seed-spots per sq. m. Mean sowing densities varying from 25 to 400 per sq. m. were obtained by varying the number of acorns per drill or spot. Some plots (a) were kept weeded, others (b) were left untended so that by the end of the season they bore continuous weed cover ca. 1 m. high and of more or less uniform density. The heights of all Oak seedlings were measured in Oct. and statistically analysed; results are presented in curves of mean height (ht.) over seedling density (s.d.). For s.d. $\geq$ ca. 150/sq. m., ht. in (a) was much superior to that in (b), irrespective of method of sowing, though it was also superior in (1) to that in (2). For (a), ht. showed a regular and marked decrease with increase in s.d., whereas for (b) it increased slightly but regularly with increase in s.d. With s.d. $>$ ca. 150/sq. m., ht. in (b) exceeded that in (a), and for the latter (2) was slightly superior to (1). Under treatment (b) there was practically no difference in the curves for (1) and (2). It thus appears that though (1) (a) is absolutely the most favourable to height growth, the seedlings somehow compete more effectively with weeds when s.d. is high. For method (1), with a sowing density of 400 acorns/sq. m. the coefficients of variation were (a) 24 and (b) 35%, and the greater height variation in the latter was no doubt due partly to greater mortality among the smaller seedlings, since the survivors numbered respectively 341 and 295. The bearing of these facts on the controversy regarding Lysenko's theory of the absence of intraspecific competition, is briefly discussed, and the need for further studies urged.

2914. LANQUIST, K. B. Seed sowing machine. *Tree Plant. Notes* No. 18, 1954 (6-7).

Detailed drawings are given of a seed driller, making 8 drills 2½ in. wide and sowing almost any

size of seed from Sugar Pine to Douglas Fir, constructed and used at the Mt. Shasta nursery of the U.S. Forest Service.

2915. BULL, W. I. **Machine for applying sand or sawdust to seedbeds.** *Tree Plant. Notes* No. 18, 1954 (20-1). [Michigan State College.]

Consists of a tractor-drawn trailer having a box large enough to hold the sawdust or sand needed for one seedbed, and a sifter with mesh of the required size in front of the box. Two men riding on the trailer scrape the sand or sawdust into the sifter. The machine is also used to apply sawdust to 1 + 0 seedlings as a mulch to prevent frost-heaving.

232.324. Transplanting and Lining Out, including Grading of Seedlings

2916. SOWASH, R. O. **Agitator type mechanical tree lifter.** *Tree Plant. Notes* No. 18, 1954 (10-2).

Developed at the Eveleth Nursery [Minnesota?]. The 'agitator' attachment loosens the soil to the depth of the tree roots and leaves the trees standing upright in the loose soil with no roots exposed, but so that they can be lifted without damage. The machine is pulled by a tractor. Sketches showing details of construction are given with a list of the parts.

2917. LANGDON, O. G. **Skilful lifting technique increases seedling survival.** *Sth. Lumberm.* 189 (2369), 1954 (153-4).

A study in S. Florida showed that of Pine seedlings carefully lifted by spade, 60% were alive one year after planting against 41% of machine-lifted seedlings. The explanation lies in the condition of the short feeder roots after lifting. In spade-lifted plants, the main roots were cut off sharply and most of the secondary roots were intact, while machine-lifted seedlings were generally pulled through the soil, stripping off many secondary rootlets.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also Nos. 2770, 2911, 2913.

2918. MCDANIEL, V. E. **Roto-tiller cultivator.** *Tree Plant. Notes* No. 18, 1954 (13-5)

Developed by the Oregon State Forest Department. Construction details are shown in 2 pages of drawings.

2919. WYCOFF, H. B. **An analysis of nursery stock production costs in relation to the use of mineral spirits [for weed control].** *Tree Plant. Notes* No. 18, 1954 (25-8). [Mason State Tree Nursery, Topeka, Ill.]

Data for savings in cost for 1946-51.

2920. SCARBROUGH, N. M., and ALLEN, R. M. **Better Longleaf seedlings from low-density nursery beds.** *Tree Plant. Notes* No. 18, 1954 (29-32). 3 refs.

In tests in S. Mississippi, in which beds were sown in March and thinned to densities of 12, 24, 36 or 48 seedlings/sq. ft. in May, planting stock from nursery beds with not more than about 24 seedlings/sq. ft. was larger at lifting time (December), survived better in the field and began height growth sooner than seedlings from denser beds.

232.326. Salvage of Overgrown Seedlings and Transplants. Root Pruning etc.

See No. 2904.

232.327. Protection Measures in Nurseries

See also Nos. 2911, 3126.

2921. TAKATOI, I., and KIKUTA, S. [Experiment on rapid cultivation of tree seedlings. (III) The growth of Larch seedlings in nursery frames covered with black enameled latticed films.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (64-74). [Jap. jap.e.]

The plant % and growth was best with the lattice intervals [painted] on the vinyl cover admitting 59% of the field light intensity and worse without any lattice, admitting 73-6%. From authors' summary.

232.328. Vegetative Propagation

See also Nos. 2655, 2678-9, 2689, 2816, 2853.

2922. SHUGERT, R. **Outdoor propagation under constant mist in Missouri.** *Amer. Nurserym.* 101 (2), 1955 (13-4, 48).

[Cf. *For. Abstr.* 16 (No. 1671).] Describes large-scale experiments, which established the superiority of vermiculite over sand as a rooting medium, and the importance of providing adequate drainage. The problems involved in hardening off rooted cuttings are discussed.

2923. MIGITA, K. [Vegetative propagation of so-called races of *Cryptomeria japonica* by cuttings]. *J. Jap. For. Soc.* 36 (7), 1954 (202-3). 6 refs. [Jap.]

Thin terminal shoots 2-3 years old and ca. 25 cm. long were cut from 6 trees of 18 Japanese races, 6 shoots from each tree (36 shoots per race) and all trees 19 years old. Planted randomized and kept shaded, they were examined after one year for root/shoot rates, callus formation and survival. Results are tabulated.

2924. OKIMURA, Y., and TOYAMA, T. [Studies on cuttings of *Pinus densiflora* (L.).] *J. Jap. For. Soc.* 36 (11), 1954 (323-6). 11 refs. [Jap.e.]

Cuttings 1-20 cm. long, taken between Feb. and April from 10- to 13-year-old *P. densiflora*, were treated with various reagents, e.g. H_2O_2 , glucose, bud and leaf sap, Rootone, before planting in various soils and sands. Results are tabulated, with English captions to tables and photographs. All cuttings rooted from callus tissue only.

2925. LEVIN, A. M. Vegetativnoe razmnzhenie duba čereščatogo čerenkovaniem. [Vegetative propagation of *Quercus robur* by cuttings.] *Lesn. Hoz.* 5 (6), 1952 (53-5). [Russ.]

Cuttings should be taken from physiologically young, green, semi-lignified shoots with well developed terminal bud and lenticels, the length depending on the age of the parent plant (1-4 years —2-5 cm.; 5-12 years—5-10 cm.); it is better to leave 2-4 small leaves than two large ones, half of each of which has to be cut off. Cuttings can be taken from lateral as well as leading shoots; this may lead to higher mortality, but the parent plant remains capable of further growth, and if the rules for taking cuttings are strictly followed, 85-100% rooting can be obtained. Rooting proceeds best under the following conditions: special rooting boxes

with perforated bottoms; a rooting medium of 4 cm. crushed brick, a 7-cm. layer consisting of 2 parts humus and 1 part coarse 'roasted' [temperature not given] quartz sand, covered with 3 cm. fine washed and 'roasted' quartz sand; boxes placed in warm frames packed at the bottom with 30 cm. of hot manure covered in successive layers with brushwood, 10 cm. of humus, and finally 4 cm. of coarse washed and 'roasted' quartz sand. To maintain maximum air humidity during the first period of callus formation, the lights of the frames are kept closed and the panes painted over. Watering depends on temperature; in dry, hot weather, the cuttings are watered 2-3 times daily; in cloudy weather a slight sprinkling suffices; aeration is regulated by drainage within the frames, by holes in the boxes and by the air let in during watering. The frames should be protected against direct sun to prevent sharp fluctuations in temperature. The temperatures required are 10-30° C. for callus formation, which takes from 15 to 20 days, and 13-20° for rooting. The first roots appear 10-15 days after callus has been formed. Cuttings from trees 5-20 years old root best and develop main roots 16-23 cm. long. Cuttings rooted in 1949, and kept during the winter in cutting boxes in frames or in cellars at 0° were planted out in the open in April 1950; cuttings taken from leading shoots of physiologically young parts of the parent tree showed best growth; those from lateral shoots often developed a lean, necessitating staking. Examined in Oct. 1951 the root systems differed from those of seedlings by having several (up to 16) main roots instead of one, while retaining a 'tap' root penetrating deep into the soil. Another peculiarity of the rooted cuttings was the size of their root collar, viz. 5.5-6.2 mm. while that of seedlings (standard specification) should be 5-10 mm. for grade I, and 3 to 5 mm. for grade II.

2926. GERASIMOV, M. V. Spособы vegetativnogo razmnoženija evkommii. [Vegetative propagation methods for *Eucommia ulmoides*.] *Lesn. Hoz.* 5 (7), 1952 (80-2). [Russ.]

Refers especially to the use of KMnO_4 for stimulating the rooting of leafy cuttings. These must have 2-3 leaves and be cut to leave ca. 2 cm. of internode at the base. Ca. $\frac{1}{2}$ of the leaf blades should be trimmed off to reduce transpiration. For cuttings from the upper, unripened part of the shoot 0.05% and for those from the middle and lower parts 0.1-2% KMnO_4 gave the best rooting; stronger concentrations reduce the rooting % and may be fatal. Only the basal portion (internode) should be steeped, 20 hours being the optimum. Cuttings are then planted 2 cm. deep and 3 cm. apart, in rows 5 cm. apart, in a medium made of 3 parts of fine peat, 1 part of well rotted leaf mould, and 2 parts of river sand, in frames where the humidity should be kept at 89-90% by watering. After 30-40 days most of the cuttings will be rooted, with a symmetrical root system (unlike those of untreated cuttings, which require soil heating to 3-7° C. above air temperature for best results). The rooted cuttings, which have somewhat fragile roots, are carefully transplanted to grow on in rich, deeply worked nursery beds. Good planting stock, though in smaller amounts can also be obtained by the Chinese method of layering, i.e.

planting a 1- to 2-year-old plant on the slant and pegging its shoots down into furrows ca. 18 cm. deep in the soil, covering their whole length except the tip; any shoots produced by the buried portion are likewise pegged down and covered with earth; in the autumn the rooted layers are severed from the parent.

2927. HYODO, M. [On the propagation of *Edgeworthia papyrifera* (Kochi-race). Especially by stem cuttings horizontally placed in the medium.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 74, 1954 (149-76). 13 refs. [Jap.e.]

Increased shoot development resulted from various soil-cover and planting methods and in the 'callus pit method'. The greater the diam. and length of cuttings, the greater was the number of shoots. Growth-regulator treatment before setting had no effect on shoot development, nor was any definite relationship established between age of cutting and number of shoots.

2928. BOIČENKO, E. P. Podzimnee čerenkóvanie. [Late-autumn planting of cuttings.] *Lesn. Hoz.* 5 (5), 1952 (74). [Russ.]

Trials in the Batai nursery (Rostov Province) showed almost no difference in survival or growth between cuttings of 'Canadian Poplar', 'Turkestan Poplar' [*P. alba* var. *bolleana*], *Philadelphus coronarius*, *Spiraea vanhouttei*, and *Tamarix ramosissima* planted early in November and those planted early in spring after winter storage in sand; and this despite the fact that the former were watered only once (in April) and the latter twice. By July the former had grown in height as follows:—'Canadian Poplar' 50-60 cm., 'Turkestan Poplar' 40-45 cm., *P. coronarius* 50 cm., *Spiraea vanhouttei* 30-35 cm., and *T. ramosissima* 50-65 cm.

2929. BOKOR, R. Adatok a fehér és szürkenyár vegetatív szaporításának kérdéséhez. [Contributions to the problem of the vegetative propagation of *Populus alba* and *P. canescens*.] *Erdészeti Kutatások, Budapest* 1954 (1), (18-25). [Hu.russ.e.g.] From *abstr. in Hung. agric. Rev.* 3 (3), 1954 (8). [E.] C.G.B.

Cuttings of *P. alba* and *P. canescens* were put in a nutrient solution and then in flower pots. For 50-60 days watering was done to saturation, and thereafter to 50-60% of saturation. The basal portion of long shoots give the maximum number of roots. Shoots should be cut in February, divided into cuttings, and these matured, e.g. by sticking them into moist sand in a cellar at 1-3° C., until April, when they are transferred to the nutrient solution. The shooting of cuttings is not affected by their length or diameter. Only undamaged portions of shoots should be used.

2930. FUKUDA, Y., and TAKAOKI, T. How electric current stimulates the root formation of *Salix* cuttings. *Bot. Mag., Tokyo* 66 (783/784), 1953 (211-5). 21 refs. [E.e.] I.M.I.

Bundles of cuttings, 14-29 cm., of *Salix babylonica*, totally immersed in water, were subjected to DC (100 volts, 0.18-0.20 milliamp/sq. cm.) with the anode at the base of the cuttings, for 0, 1, 10, 30 sec., 1 or 3 min. The cuttings were kept in the dark (to prevent new hormone formation) and recorded

after 10-12 days for number and length of roots. All treatments were better than controls, that of the one-minute stimulation being best (roots 3.1 times as many, and 2.9 times as long). Sprouting was not affected. Reversing the direction of the current did not improve root growth over controls. Cuttings stimulated (100 volts, 0.54 milliamp/sq. cm.) for 30 sec. and then halved after one minute, one hour or 60 hours showed root growth increases and decreases in the lower and upper halves respectively, the values becoming respectively greater and less with increasing interval before halving. This tendency was also evident in the halved controls. The ratios, root number upper-/root number lower-half become larger as the interval before halving increases but they are essentially the same in treatments and controls. These differences indicate a downward movement of root-growth-promoting substance in both controls and treatments. The number of roots produced by cuttings (13-25 cm.) of this species kept in the dark is proportional to their lengths. The average length of an internode was ca. 3 cm. and the number of roots produced was 1.56 for each 3 cm. of length.

2931. DIMPFLMEIER, R. Pflropfungen an Waldbäumen durch Professor Dr. Heinrich Mayr vor 55 bis 60 Jahren. [Grafts of forest trees made by Heinrich Mayr 55 to 60 years ago.] *Z. Forstgenet.* 3 (6), 1954 (122-5). 9 refs. [G.g.c.]

Notes on surviving grafts between different species of the same genus made by him at Grafrath—including 3 *Larix leptolepis* on *L. decidua*; 2 *Pinus peuce* on *P. strobus*; and 1 *P. koraiensis* on *P. strobus*. Diameter growth of stock and scion are compared from increment cores.

2932. WELLS, J. S. Grafting Pine and Spruce. *Amer. Nurserym.* 101 (1), 1955 (15-6, 54-9).

A review of current practice.

2933. PERRY, T. O. A grafting technique for forest genetics research. *J. For.* 53 (1), 1955 (33).

In Slash and Loblolly Pine, takes of the normal cleft graft are successful at all seasons if it is protected by a polyethylene bag for 6 weeks and shaded from hot sun. Takes are, however, too low for practical work in May, June and early July. Cone-bearing twigs grafted in August flowered again in January and the 2 seed lots will be matured in successive years. Grafting can be done as late as one month before flowering, and pollen collection and pollination can thus be relegated to the greenhouse or seed orchards. The protection of maturing cones (e.g. by spraying) is more easily undertaken in the seed orchard than in the forest, where climbing is necessary and where 75-100% of pollinated cones may be lost to insects or disease.

2934. MERGEN, F. Heteroplastic micrografting of Slash Pine. *Sta. Pap. Stheast. For. Exp. Sta. No. 47*, 1954. pp. 17. 19 refs.

In an attempt to shorten the period between generations, different types of graft were made, using *P. elliotii* 1.5-6 months old as scion and *P. elliotii*, *P. taeda*, *P. rigida*, *P. ponderosa*, *P. clausa*, and *P. strobus*, *Picea glauca* and *P. abies*, *Larix decidua*, *Pseudotsuga taxifolia* and *Chamaecyparis obtusa* as

stocks, aged 2, 4 or 24 months. The grafting technique is described in detail. Successful grafts were obtained on all the Pines except *P. clausa*, on Douglas Fir and on the two Spruces. Many of the failures resulted from mechanical difficulties or inability of the stock plant to survive in the subtropical climate of Florida where the experiments were made. Although no flowers had developed after 1 year, the grafts will be kept under observation to see if the treatment, although not able to induce flowering in 1- to 2-year-old seedlings, can induce premature flowering.

2935. MERGEN, F., and ROSSOLL, H. How to root and graft Slash Pine. *Sta. Pap. Stheast. For. Exp. Sta. No. 46*, 1954. pp. 22.

Describes, with detailed illustrations of the various steps, air layering, cleft grafting with succulent tissue of both stock and scion, bottle grafting with dormant scion, veneer grafting and cleft grafting, the use of a humidity chamber for field grafting, removing grafting rubber and tape after union is completed in all types of graft, and inarching a seedling into a mature tree.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See also No. 3643.

2936. HAWORTH, F. The establishment of green manures in mature tea areas. *Tea Quarterly, Talawakelle* 23 (4), 1952 (114-6 + 1 plate). L.S.

Describes tests made in raising two shade trees, *Albizia falcata* and *Grevillea robusta*, in two different sizes of basket and with various fertilizer treatments, in order to obtain vigorous plants not less than 18 in. tall and able to compete with mature tea bushes. The larger baskets were 8 in. in diam. and 10 in. deep. Two types of fertilizer mixture were used; (1) CaCN_2 (1 pt.), basic slag (2 pts.), KCl (1 pt.), and (2) $(\text{NH}_4)_2\text{SO}_4$ (3 pts.), superphosphate 20% (2 pts.), KCl (1 pt.); these were mixed in varying proportions with soil and compost. With large baskets and adequate fertilizer supply, plants were obtained 2 or 3 times the size of those raised in small baskets with insufficient fertilizer. Assuming a survival of 90% the cost amounts to ca. \$0.84/plant.

232.33. Formation of Stands by Direct Sowing

See also Nos. 2869-70, 2913, 2962.

2937. MANN, W. F., JR., and DERR, H. J. Direct seeding of Southern Pines. *Sth. Lumberm.* 189 (2369), 1954 (115-7).

Recommendations for Longleaf, Slash and Loblolly Pines.

2938. SILKER, J. H., and GODDARD, R. E. Direct seeding tests with Slash, Loblolly, and Longleaf Pine in Southeast Texas. *Tech. Rep. Tex. For. Serv. No. 7*, 1953. pp. 36. 6 refs.

Experiments in direct sowing of *Pinus elliotii*, *P. palustris* and *P. taeda* were carried out during 1939-51 in southeast Texas. The following conclusions have been reached on the possibility of direct sowing of these species on cut-over Pine or burnt Pine/hardwood sites in this region. (1) Spot-sowing of unprotected *P. elliotii* on cut-over *P. palustris* areas

gives better germination and survival than broadcast sowing. Sowing of 2-3 seeds per spot with a seeding gun may be a practicable method. (2) Pelleted seed of *P. elliottii* and *P. taeda*, coated with a mixture of Semesan, dried blood, keto-succinic acid, phosphate and rodent repellents [not specified] gave an average germination 60% below that of untreated seed. (3) *P. elliottii* did better than *P. taeda* on untreated grass sod; the latter succeeded only when the ground was disked before sowing. (4) Early winter is the best season for broadcast sowing; spot sowing can continue until about the middle of March. (5) Broadcast sowing of Pine is a practicable means of re-establishing desirable forest growth on Pine/hardwood stands devastated by wild fire. Seedbed conditions and lack of competing vegetation make the first winter after a severe fire the most favourable period for broadcast sowing on fire-devastated areas. (6) Satisfactory results from direct sowing may be expected in 3 out of 4 years; periodic drought is the chief enemy to germination and survival. (7) Experimental data suggest that 1 lb. seed/acre is a satisfactory rate for broadcast sowing in this area. *From authors' summary.*

2939. SHIPMAN, R. D. Preliminary tests of direct seeding of Longleaf Pine in the South Carolina Sandhills. *Res. Note Stheast. For. Exp. Sta.* No. 72, 1955. pp. 2.

Losses to birds and rodents of seed sown on unprotected spots were high—16 and 78% respectively on winter-sown and 26 and 60% on spring-sown plots. Even on plots protected by screen, losses to rodents were 31 and 48% for winter and spring sowing respectively. Critical soil moisture and temperature conditions coincided with low rainfall in May, and in 726 protected and undamaged spots 20% of winter-sown and 3% of spring-sown seed had produced established seedlings by the end of the growing season. Other less conclusive results suggested that better survival may be expected on sandy loam than on sand, and on old field sites than on scrub Oak areas. Mulching seed spots with sawdust did not appreciably increase germination or survival. Further research is needed.

2940. Do birds see red? *Sth. Lumberm.* 189 (2369), 1954 (117).

In tests by the Southern Forest Experiment Station, scalped seed-spots were sown with untreated Loblolly Pine seed, untreated seed covered with two shades of red, and with blue or yellow sawdust, seed flocked with yellow rayon, seed dyed with brilliant bronze, green bronze or aluminium, and tetramine-treated seed uncoloured or dyed aluminium. Seedling counts 4 months later showed that on the spots covered with red sawdust, 12.9 and 14.4% of the seed had escaped the birds, results significantly better than the 2% average on the other 9 spots.

2941. ENGSTROM, W. H. Direct seeding of Western Red Cedar. *Res. Note Ore. Bd. For.* No. 20, 1955. pp. 11. 2 refs.

Thuja plicata seed was broadcast by hand in March-April 1950 to simulate sowing from the air. Stocking in 1952 was unsatisfactory. This appeared

to be due to a combination of factors, e.g. the dry spring of 1951, insufficient drainage and heavy sod cover. Douglas Fir, which had been sown from the air over a larger area including the 3 plots sown with Red Cedar, germinated and became well established. Some Red Cedar became established in the better drained part of the plots, and good stocking was obtained from a helicopter sowing in 1952 in a well drained area. The amount of seed hand-broadcast ($\frac{1}{2}$, 1, $1\frac{1}{2}$ lb./acre) made little difference to the stocking; $\frac{1}{2}$ lb./acre would give satisfactory stocking with favourable ground cover, drainage, and moisture during the growing season.

2942. ISTOMIN, L. A. Opyt aëroseva v Kirovskoi oblasti. [Trials of aerial sowing [of Scots Pine] in Kirov province.] *Lesn. Hoz.* 5 (7), 1952 (86-7). [Russ.]

A note on results of trials undertaken in 1939 (2000 ha.) and 1940 (1000 ha.) with a view to regenerating the extensive concentrated fellings and burns in Kirov province. Pine was sown at 1.5 kg./ha. from a height of 30-35 m. on unprepared ground, mainly on burns formerly under quality III-IV Norway Spruce, but also on former Pine sites, ranging in both cases from *Hylocomium* to *Sphagnum* types. With no subsequent tending, success was practically confined to Spruce sites of the *Hylocomium* type (mean ht. 1.3 m. by 1946). Sowings on the *Sphagnum* types failed completely. On the better types Aspen and Birch were competing with or had eliminated the Pine. Aspen should be completely removed from Pine sowings and its proportion in Spruce reduced to 20%. Birch, seedling or coppice, may be left to constitute 30% of the young crop.

2943. B., I. Rezultaty aëroseva sosny. [Results of aerial sowing of Scots Pine.] *Lesn. Hoz.* 5 (7), 1952 (88). [Russ.]

[Cf. preceding abstract.] A note on results of trials in the Gor'kiy region on two areas totalling 470 ha. of Spruce/broadleaved forest felled in 1938 and 1939: (1) had clay-loam soil with a dense grass cover, and (2) with sandy soils varying in moisture, had been burnt, when sown (at 1-1.2 kg./ha.) in spring, 1941. Neither area was subsequently tended and (1) was heavily grazed during the war. In 1951 (1) had 1000-1500 Pine seedlings/ha. growing in clumps in dense broadleaved thicket. In (2) the stand varied according to site type. On the *Polytrichum* type there were 15,500 stems/ha. 4500 being Pine (mean diam. 2.0 cm., ht. 0.7 m.) and on the lichen type only 4900 stems, 4600 being Pine (mean diam. 3.0 cm., ht. 1.1 m.).

Results are considered satisfactory but could be bettered with ground preparation and subsequent tending.

2944. JAKOVLEV, N. JA. Opyt zaguščennyh posevov na svežih lesosekah. [An experiment in restocking after recent fellings by dense [patch] sowings.] *Lesn. Hoz.* 5 (5), 1952 (40-2). [Russ.]

In the northern forests of the U.S.S.R., the complete mechanization of felling and skidding operations usually destroys the undergrowth and many of the seedbearers, and has led to a change of species, valuable Pine and Spruce stands being

supplanted by Birch, Grey Alder, and Aspen from suckers and coppice, the last generally affected by heart rot. In the taiga, regeneration of conifer stands by the usual methods is too costly in money, labour and seed, and the tending of plantations is far beyond the capacity of most of the enterprises. A much simpler method of regenerating to conifers has been devised by the Leningrad Conservancy, based on Lysenko's theories. This consists of sowing conifer seed direct in small 0.5-sq. m. patches (prepared by tearing off the moss cover and raking off the litter), scattered throughout the felling site in places judged suitable for seedling development (e.g. close to stumps, bonfire sites, disturbed patches of soil). There should be ≤ 1000 such patches per ha. with ≤ 100 seeds sown in each, giving a seed requirement of 0.5 kg. per ha., which is $\frac{1}{3}$ of the usual amount required. This method was first tested in 1950, but only on recent Pine and Spruce felling sites where little change in ground vegetation or soil structure had yet occurred; in many areas such sowings have given a satisfactory plant %.

2945. PREOBRAZHENSKIĬ, A. V. Gustota poseva semjan hvoynih na svezhih leseokah. [Density of conifer sowings on recent felling sites.] *Lesn. Hoz.* 5 (7), 1952 (17-8). [Russ.]

An experiment to ascertain the right density of sowings in 'nests' was laid out in 1948 by the Kirov Technical Forestry Academy on an area clear felled in 1947-48 (previously carrying quality-II, 100- to 130-year Spruce with some Aspen, Birch, and occasional Pine, and an *Oxalis*/fern type of ground cover) on a fresh clay-loam. In June 1948 one ha. each of Scots Pine, Norway Spruce and Siberian Larch (seed of 75, 67, and 43% germinative capacity respectively) was sown in 2-sq. m. patches (200 per ha.), the soil of which was loosened with mattocks and rakes without turning up the podzolized layer below. The seeds were raked in at four densities (30, 100, 500 and 1000 per patch) and assessments of survival and height up to 1951 (tabulated) showed that, for all species, 500 seeds per 2-sq. m. patch gave the best results; 300-400 patches would be necessary per ha. to secure adequate stocking of the desired species. By May 1951 mean heights were: Larch 40.8; Pine 13.5 and Spruce 16.0 [cm.]. The increasing numbers of failed patches between 1948 and 1951 is attributed to waterlogging, and indicates that micro-depressions should be avoided.

2946. TRAVENI, F. I. Spособы vyraščivaniya duba v stepnyh raionah Jugo-Vostoka. [Methods of raising Oak in the steppes of S.E. Russia.] *Lesn. Hoz.* 5 (5), 1952 (4-12). [Russ.]

An investigation of the pre-1949 shelterbelts in the S.E. parts of European Russia disclosed that many were of very low density. In some cases this is ascribed to the use, as principal species, of Ash and Robinia, neither of which can be relied upon for this purpose, or serve as substitutes for Oak, Larch or Birch. In many shelterbelts there is no Oak; in others, Oak has been suppressed or killed by unsuitable (or unsuitably spaced) accessory species. The early growth of Oak is slower on the drier soils, especially on chestnut soils, where it is urged

that dense sowing, e.g. in groups or 'nests', should encourage early development of a deep root system. Repeated soil cultivation is essential to prevent compaction and cracking, as well as to control weeds; neglect of this measure is blamed for many of the poor results. In addition, on areas bared of snow by the wind, many of the young Oak have perished from winter cold (in the winter of 1950-51 temperatures of -35° to -40° C. killed almost all unprotected 'nest'-sown 1-year Oak in some southern parts of Stalingrad Province). As a counter measure it is recommended that the Oak should be sown between snow-trapping 'walls' (strips) formed by advance planting of fast growing species (e.g. *Betula verrucosa* and *Ulmus parvifolia*). A 60-m. shelterbelt would have 3 such walls, one along each edge, and one in the middle, between which the Oak would be sown 1-2 years later; soil-protecting shrubs should be introduced when the Oak closes up. Lay-outs and species for various conditions are discussed.

2947. LOZOVOL, A. A. Vyraščivanie duba na gosposloe Gora Višnevaja-Kaspijskoe More. [Raising Oak in the Gora-Vishnevaya/Caspian-Sea State shelterbelt.] *Lesn. Hoz.* 5 (5), 1952 (13-8). [Russ.]

In view of the complete failure since 1949 to secure adequate establishment of Oak in this shelterbelt, owing to frost [cf. preceding abstract] sun scorch of the root collar, suppression by cover, crops or drought damage after their removal, the author suggests planting pure rows of shrubs and Birch to nurse up the Oak (shrub/Birch/shrub/Oak/shrub/Birch, etc.), the Oak being introduced 1-2 years later by sowing in groups of 5-6 acorns at 50-cm. intervals in furrows 10-12 cm. deep, all rows to be spaced 150 cm. apart.

2948. JURKE, N. A. Predupreditj izreženosti vshodov v gnezdovyy posevah duba. [Improving the density of the seedling stand in 'nest' sowings of Oak.] *Lesn. Hoz.* 5 (5), 1952 (36-7). [Russ.]

Even when all instructions for raising Oak by the 'nest' method in the S.E. of European Russia are meticulously followed, mortality still remains high. This the author attributes partly to inadequate amounts of seed—the standard 100 kg./ha. being much too low to produce the 20,010–23,345 seedlings required in the 667 nests/ha., because it assumes clean seed of 100% germinative capacity (g.c.). He stresses the importance of purity, g.c. and 1000-seed weight in calculating seed requirement/ha., and presents a table showing corrected values for seed of 96% purity with g.c. varying from 40 to 95% and 1000-seed weight from 2500 to 5000 g. Furthermore, small acorns should be sown separately, with a thinner soil cover because they germinate less vigorously, and preferably on moister sites; when sown along with large acorns they germinate 10–20 days later, generally at the onset of the hot season, which increases mortality.

2949. KIRSANOV, M. P. Sozdanie dubovyh lesov v Sal'skikh stepyah. [Raising Oak forests in the Sal'sk steppes.] *Lesn. Hoz.* 5 (7), 1952 (5-7). [Russ.]

Under the droughty conditions of the Sal'sk steppes, 'nest' sowings of Oak (spring 1950) with agricultural cover crops failed except where the

patches were freed from the cover crops, weeded and cultivated; the autumn-sown auxiliary species showed complete failure by June of the next year [cf. *For. Abstr.* 15 (No. 234)]. Much better results were obtained with sowings on clean fallow, provided that the soil was worked and kept clear of weeds during the summer. The problem was therefore to choose a method of sowing less costly (in money and labour) as regards cultivation and weeding. Line sowings, without agricultural cover crops, in groups of 3 seed spots, spaced 3 m. apart, proved cheaper (158.57 instead of 203.07 Roubles/ha.) than 'nest' sowing in quincunx widely spaced in agricultural cover crops. It is urged that local experience (as gained e.g. by the shelterbelt stations) should prevail over standard sowing methods declared to be suitable for the widest range of conditions.

2950. SARKSIAN, S. A. Vyráščivanie duba v uslovijah polupustynnykh kamenistykh počv pri orošení. [Raising Oak [for shelterbelts] on stony semi-desert soils [in the lowlands of the Ararat region, Armenia], with irrigation.] *Izv. Akad. Nauk armjansk. SSR (biol. sel.-hoz. Nauki)* 7 (6), 1954 (21-31). 13 refs. [Russ.arm.] N.C.L.

Gives some account of trials begun in 1949 in the Shumyan district at ca. 940m. alt., on a shallow structureless soil liable to severe crusting, poor in organic matter and with poor permeability and water retention. Species such as *Fraxinus excelsior*, *Populus* sp., *Acer platanoides*, *Platanus* [orientalis?] and *Robinia pseudoacacia* had already proved possible on these sites. For the Oak [*Quercus robur*?] trenches 60 cm. deep × 60 cm. wide were prepared, filled to $\frac{3}{4}$ of their depth (partly with top-soil), surfaced with mixed turf-loam and manure to prevent crusting, and inoculated with soil from under Oak woods. Trials included direct sowing of germinating acorns and planting of 1-year stock [no details are given of spacing]. Treatments included various watering régimes, soil loosening, mulching etc., shading with tall grasses sown along the edge of trenches and/or with other crops. The plantations were pure-line mixtures of Oak and *Populus* sp., *Elaeagnus* sp., *Fraxinus* or fruit trees. Some figures are given to illustrate growth of the Oak up to the end of 1953, when the tallest plants measured up to 220 cm. (averages of 20 plants each were 176 cm. for planted and 87 cm. for sown). Early sowing (20 March) was better than late (20 April). The best results were obtained from 20 waterings (morning and evening) during the first growing season. Shading was decidedly beneficial, producing larger and deeper-rooted plants, whether planted or sown. Measures to keep the soil surface open and weed-free were also important.

2951. LJUBIČ, F. P. Vzaimootnošenje kornevnykh sistem osobei duba cereščatogo (*Quercus robur* L.) i drugih drevesnykh porod pri gnezhdovom sposobe kul'tury. [Interrelation of root systems of individual plants of *Q. robur* and of other woody species in the 'nest' method of establishing plantations.] *Dokl. Akad. Nauk SSSR* 97 (3), 1954 (535-8). 4 refs. [Russ.] [Astrahanskaja Kompleksnaja Sel'sko-hozjaistvennaja Opytnaja Stancija.] A.P.B.

In studies extending over 6 years, at the Astrakhan Agricultural Experiment Station, on irrigated plantations formed by the nest method (with varying numbers of seed-spots/nest) and by line sowings [no data given for the latter], root relationships were found to change markedly with age. In shallow-rooting species [no detail given] both main and lateral roots develop well in the first year, but in tap-rooted species, e.g. Oak [to which this paper is devoted], the main root grows strongly (down to 1.5 m.), but the laterals only feebly, in the first 2 years. In the third year stronger development of laterals begins, and at this stage the root systems in the nest sowings are very irregular and asymmetrical: marginal plants in the seed-spots develop strong laterals into the adjacent free rooting space but few or none towards the centre of the spot, and on this side even earlier formed laterals tend to die back, while the centre plants are usually depauperated and possess a spindly tap root with few or no laterals on any side. Development of the shoots and leaves is the more vigorous, the better developed the root system, and seed spots with many seedlings show strong differentiation of growth between individuals. As, under irrigation, moisture could not be the limiting factor, this behaviour must be attributed to exhaustion of nutrient supplies in the centre of the spots. It is concluded that it is useless to sow more than 4-5 acorns/spot. In the 4th or 5th year, the root relationships are completely changed by the occurrence of numerous root-grafts between seedlings; these may occur at or near the collar, between main roots, or between laterals, and very complex root systems result which are much larger than those of single, isolated seedlings. The crowns correspondingly develop more shoots and leaves. Where root girdling occurs the weaker seedling goes into check and its shoot system gradually dies back, and whether girdling takes place or not, the same tends to happen to all weaker seedlings, but in both cases the roots persist as part of the new compound root system, to the benefit of the surviving stems. The relative absence of laterals towards the centre of a spot, formerly disadvantageous, now becomes an advantage as it facilitates rapid natural grafting between adjacent main roots.

2952. NIKITIN, I. N. Novye idei v lesovodstve v svete Mičurinskoj agrobiologii. [New ideas in silviculture in the light of 'Mičurinist agrobiology'.] *Lesn. Hoz.* 5 (6), 1952 (13-8). [Russ.]

[Cf. preceding abstract.] Various examples are quoted in which trees grown in dense groups, with natural grafting of the root collars and/or root systems, appear to have increased vitality (as judged by survival) and growth compared with isolated trees. To encourage natural root-grafting, dense sowing and planting in patches are recommended; silvicultural operations should aim at 400-500 patches/ha. at maturity, with 2 to 5 naturally grafted trees per patch.

2953. KORJAKIN, D. A. Rost i ustoičivost' kul'tur duba v Tul'skikh Zasekah. [Growth and resistance [to injurious agencies] of Oak plantations in Tula Province.] *Lesn. Hoz.* 5 (6), 1952 (44-6). [Russ.]

A comparison of Oak plantations raised from seedling stock with those from direct sowings, showed that the latter were better established and of higher productivity. Tables giving heights, diameters, volume and number of trees per ha. are included for stands 7 to 53 years old.

2954. VANĚK, J., and TOUFAR, J. Ochrana žaludové sije proti zvěři a drobným hlodavcům. [Protection of acorn sowings from deer and small rodents.] *Lesn. Práce* 33 (9), 1954 (410-5). [Cz.]

Describes the damage done to acorns by pheasants, small rodents, and deer, and lists the germination % and length of shoot of acorns treated with solutions of pyridine, extract of *Datura stramonium*, emulsion of suint [natural sheeps-wool oil], Resiston A, oil [paraffin?] or glass wool.

2955. WIŚNIEWSKI, J. Proby siewu osiki w uprawach. [Trial sowing of Aspen in plantations.] *Las polski, Warszawa* 28 (5), 1954 (12-5). [Pol.] From *abstr. in Prehl. lesn. Lit.* 5 (9), 1954 (No. 3548). [Cz.] P.R.

Trial direct sowings of *Populus tremula* were made in old and middle-aged stands (area 0.2-0.5 ha.). The soil was carefully prepared, the sod being matted and soil loosened in 2-sq.-m. patches spaced 5 x 5 m. apart. Brushwood was burned on the soil to sterilize it against *Fusarium* spp. The patches were well watered several hours before sowing at 100 seeds per patch. After sowing, the patches were covered with leafy twigs, and watered in the morning and at noon. Protection against deer is important.

2956. GARTZ, J. F. Stratified Douglas Fir seed sown in April, May and June. *Res. Note Ore. Bd. For. No.* 19, 1955. pp. 19. 3 refs.

Examination, in August to November, of plots in the Tillamook Burn sown in April to June, indicated that spring sowing is inferior to autumn; further investigations are, however, desirable. April appeared to be the most favourable time for spring sowing and this was confirmed by statistical analysis of the results. Seedling establishment was significantly better on N. and on E. slopes, 76% of all seedlings being found there. The amount of rainfall in the 30 days following sowing appeared to affect stocking but there was insufficient data for a statistical analysis. There was a somewhat lower proportion of seedlings where mineral soil was exposed but the difference was not statistically significant.

232.4. Formation of Stands by Planting

See also Nos. 2844-5, 2953.

2957. KUNDZIŃSKI, A. V. Kultura černoí oljhi v Latviškoí SSR. [Raising *Alnus glutinosa* in the Latvian S.S.R.] *Lesn. Hoz.* 5 (7), 1952 (14-6). [Russ.]

A report on investigations started in 1946 by the Forestry Institute of the Academy of Sciences, Latvian S.S.R., in view of the unsatisfactory natural regeneration of *A. glutinosa*, whether by seed or coppice. Soils with stagnant ground water or compact clays are unsuitable: *A. glutinosa* does best on well drained soils with moving ground water and

loose topsoil rich in humus (height m.a.i. for the first 13 years 60-70 cm. or even 1 m.); it also thrives (height increment 40-70 cm.) on deep peats with herbaceous ground vegetation [fen types?] (where its roots do not reach the mineral soil), provided that excess water is drained off. Two-year-old stock (seedling or transplant) is best for most conditions and any method of planting can be used. Good results have been obtained by an 'under-the-turf' method of planting which consists in undercutting three sides of a 30 x 30 cm. piece of turf, slitting it in two as far as the middle, and rolling it back; the uncovered soil is then slightly loosened and the plant, with its roots carefully spread, is placed in the middle and the turf replaced and firmed, thus surrounding the stem. Turves should be thin, as otherwise the plant would be too deeply inserted. On very moist sites, planting is done on fairly thick inverted turves (50 x 50 cm.) and the roots are covered with a thinner turf (grass upwards) slit half way down the middle to admit the stem. The usual spacing is 2 x 1.5 or 1.5 x 1.5 m., but on lighter soils or with smaller plants, 1 m. in, and 1.5 m. between, the rows is recommended; for sites with heavy grass the 'nest' method is recommended (nests at 3-m. spacing, each with 2-year plants in quincunx). Planting should be done in spring except on flooded or very wet sites, where autumn planting is more practicable. On poor sandy soils *A. glutinosa* can be mixed with Pine, as an auxiliary soil-improving species, and requires the soil to be deeply cultivated and the pan broken up.

232.41. Planting Stock (Type, Handling and Treatment).

See also Nos. 2903-4.

2958. KĘDZIERSKI, Z. Badania nad wzrostem na uprawie jednorocznych sadzonek dębowych (*Quercus pedunculata*) różnych klas jakości. [Investigations on the growth in plantations of one-year Oak (*Q. robur*) of different quality.] *Sylvan* 98 (5), 1954 (429-37). 3 refs. [Pol.]

[Cf. *For. Abstr.* 15 (Nos. 2477, 3525).] One-year Oak, randomly selected from a nursery, were separated into 4 ascending stem-length classes viz. (D) < 8 cm., (C) 8-12 cm., (B) 12-20 cm., and (A) > 20 cm., and a fifth group (E) of ungraded controls. These were then planted out so that each of the groups A-E formed a unit of a Latin square. It was found that D had the highest and A the lowest height increment, while B, C and E showed intermediate values. A distinct correlation could be observed between height increment and shoot/main-root length ratio, viz. the lower this ratio the greater the height increment.

2959. LIMSTROM, G. A., FINN, R. F., and DEITSCHMAN, G. H. Planting stock grades for Yellow Poplar [*Liriodendron tulipifera*]. *J. For.* 53 (1), 1955 (28-32). 5 refs.

The characteristics of 1 + 0 seedlings produced from the same seed but in 5 different nurseries were analysed in detail for correlation with survival 2 years after field planting. Some field plants were pruned to 5 in. shoot for comparison and all roots were reduced to 8-10 in. to suit field planting. Sites

were (a) dry, exposed and (b) moist, protected. It was found that stem diam. was the most important criterion for survival, that shoot pruning to 5 in. had no effect, but that the reduction of the roots of larger plants to 8–10 in. took too much away from the plant. The minimum diam. at the collar for (a) should be 0.25 and for (b) 0.2 in. The maxima, if roots are reduced to 10 in. or less, are respectively 0.35 and 0.4 in.

2960. CURSCHMANN, O. H. Zur Sommerverschulung von Laubholzwildlingen. [Summer transplanting of broadleaved wildlings.] *Wald* 2 (6), 1952 (188–9). [G.]

Describes the transplanting of 1- to 2-year wildlings into shaded nurseries (fresh sand or sandy loam under Pine) late in summer. Though some plants shed their leaves prematurely, 98% of Red Oak, Sycamore Maple and *Prunus avium*, and 90–92% of Hornbeam leaved the following spring, and developed improved root systems. Many were planted out the following winter. Wildlings are easier to find in summer, and more labour is available for the work.

2961. WATANABE, S. [On the transplanting of *Acacia mollissima*.] *J. Jap. For. Soc.* 36 (11), 1954 (347–8). [Jap.e.]

Two years' experiments involving > 400 1-year-old transplants, the tops of which were cut off at heights of 0–40 cm. from ground level, showed best survival in the 20-cm. height.

2962. KADAMBI, K., and DABRAL, S. N. Studies on the suitability of the different methods of artificially regenerating forest trees (sowing, entire transplanting, and stump planting). *Indian For.* 81 (2), 1955 (129–51).

Brings up to date the information published in *Ind. For. Rec.* No. 16 (1932) on the use of stump plants in artificial regeneration. Notes, based on work at Dehra Dun and elsewhere, are given on a large number of species, indicating the methods best suited to each. Very full experimental data are presented.

2963. KUSNETZOW, W. J. [KUZNECOV, V. I.]. Über Qualitätsweiser des Pflanzgutes. [Quality criteria in planting stock.] *Wald* 2 (6), 1952 (166–7). [G.]

Recommends heeling-in on the planting site in moist, shaded trenches, if necessary with added humus, as a means not only of restoring plants weakened by lifting and transport, but also, it is believed, of increasing their adaptability to the new environment by some process comparable to the vernalization of seeds. The strength and number of new root tips formed in this period is a good criterion of quality. Some Russian experience is touched upon [without details of species or period of heeling-in].

2964. DEFFENBACHER, F. W., and WRIGHT, E. Refrigerated storage of conifer seedlings in the Pacific Northwest. *J. For.* 52 (12), 1954 (936–8).

Nursery and field comparisons with freshly dug plants show that survival in Douglas and Noble Firs, Ponderosa Pine and Sitka Spruce is not impaired by storage up to 6 months if humidity is held

at 90–95%, temperature at 33–35° F. and the air adequately circulated. The roots should be packed in moist, washed shingle-tow (from Western Red cedar) or in moss, and wrapped in waterproof bundles with tops exposed. Mycorrhizae are apparently unaffected. *From authors' summary.*

232.42. Methods of Planting (including Use of Fertilizers etc.)

See also Nos. 2957, 2959, 2996.

2965. SATYANARAYANA, M. Cultivation of *Casuarina* around pits. *Madras Agricultural Journal*, Madras 40 (11), 1953 (507). L.S.

Describes a successful method of cultivating *Casuarina* sp., practised along the Masulipatam coast. Fifty pits/acre are dug at 30-ft. centres, each ca. 6 ft. in diameter and depth. The excavated earth is spread round them, and in the ground so raised 32 plants are planted in 2 concentric circles. Those are watered until they become established, in periods of drought until the third year. It is claimed that by this practice the girth of the plants after 3 years is at least double that obtained by the more usual methods. A summary of costs and returns is presented.

2966. Fertiliser experiments [on *Eucalyptus grandis*]. *Rep. Dir. For. Qd.* 1953/54, 1954 (13).

Application, round each tree 2 months after planting, of superphosphate at 1 cwt./acre, gave increased survival (84% compared with 67%) and total height (5.11 ft. compared with 3.46 ft.) 20 months after application. Experiments are continuing on the application of fertilizers to older plantations.

2967. BAAK, W. Erprobung und Prüfung von Pflanzgeräten. [Trials with and testing of planting tools.] *Wald* 2 (3), 1952 (72–5). [G.]

Describes and illustrates the following tools, tested at the Institut für Forsttechnik, Neuroofen: (1) Baak's notching spade; (2) Schultz's Freienwald concave spade for hole planting; (3) Smolla's notching tool, attached to the workmen's boots (one blade for each foot); and (4) Busch's hand notching tool consisting solely of a blade with a grip. Indicates for each the conditions to which it is suited and the method of use.

232.43. Spacing and Arrangement in Plantations

See also Nos. 2861, 2867, 2952, 2986.

2968. BRONICKII, S. A. Gnezhdovaja posadka sosny s berezoi. ['Nest' planting of Scots Pine and Birch.] *Lesn. Hoz.* 5 (6), 1952 (55–6). [Russ.]

Rates of growth of 1- and 2-year seedlings of Pine and *Betula verrucosa* planted in 'nests' were 170–180% those of controls raised in the same nursery but planted in rows.

232.44. Season and Time of Planting

2969. G[ALOUX], A. Résultats de l'enquête sur l'époque de plantation du sapin de Douglas. [Results of an enquiry on the planting season for Douglas Fir.] *Bull. Soc. for. Belg.* 62 (2), 1955 (127–9). [F.]

Data on 45 plantations made between autumn 1953 and spring 1954 are tabulated. Good results

were obtained by planting between 15 Aug. and 15 Dec. and between the beginning of April and mid-May. March was definitely inferior to April. Other features affecting the success of planting were the length of time elapsing between the lifting of plants in the nursery and their planting in the field, and the presence of some degree of shade.

233. Afforestation

See also Nos. 2585, 2994.

2970. VILLEGAS DE LA VEGA, R. Repoblaciones de eucalipto y pino insignie en el norte de España. [Afforestation with Eucalypts and *Pinus radiata* in the north of Spain.] Escuela Especial de Ingenieros de Montes, Madrid. 1953. pp. 235. [Span.]

Eucalyptus spp. and *P. radiata* are dealt with in two separate sections. In each, information is given on the morphology and characteristics of the tree, timber production, uses of the products, silvicultural requirements, methods of establishing stands, their silvicultural treatment, and yield and value of the products. A short appendix deals with the province of Santander with reference to past and future work in afforestation.

2971. Comment reboiser: conditions et techniques particulières aux terres lourdes de l'ouest. [Reforestation: conditions and techniques peculiar to the heavy soils of the west.] *Étud. Com. consult. Rebois.*, Paris No. 2, 1953. pp. 7. [F.]

A brief description of the type of site, site preparation and equipment needed, and of sowing and planting methods.

2972. Comment reboiser: techniques du travail du sol. [Reforestation: techniques of soil treatment.] *Étud. Com. consult. Rebois.*, Paris No. 3, 1953. pp. 16. [F.]

Burning, cultivation and miscellaneous treatments (e.g. the use of explosives, and planting without any soil working), choice of technique according to site, and notes on soil types.

2973. Comment reboiser: défense contre quelques ennemis du reboisement. [Reforestation: protection against some enemies.] *Étud. Com. consult. Rebois.*, Paris No. 5, 1953. pp. 12. [F.]

The use of firebreaks, chemical control and fencing against animals (rabbits and deer), and the exclusion of walkers and tourists.

2974. Comment reboiser: reboisement en pin maritime dans les landes de Gascogne. [Reforestation: the use of *Pinus pinaster* in the Landes of Gascony.] *Étud. Com. consult. Rebois.*, Paris No. 6, 1953. pp. 12. [F.]

Discusses soils, preparatory work, sowing, planting, tending and the introduction of hardwoods.

2975. SALLENAVE, H. Le reboisement de la zone littorale d'une forêt de dunes. [The reforestation of the littoral zone of a dune forest.] *Rev. for. franç.* 7 (1), 1955 (39-48 + 6 photos). [F.]

The littoral zone of the forest established ca. 150 years ago on the dunes near the Pointe de Grave, has never been exploited, but there are now large gaps in it, owing partly to age and partly to neglect during

the German occupation. The methods now being employed to fix and replant the bare areas are described: they consist in (1) palisades, (2) hedges of *Atriplex* and *Cupressus*, and finally (3) planting with Pines.

2976. KÁLDY, J. Erdősítések eredményeségéről. [The results of afforestation [in Hungary].] *Erdő* 3 (1/2), 1954 (162-4). [Hu.]

A survey of half of the 85,000 ha. of newly planted forests in Hungary showed fair success (average 73.8%), but also revealed many shortcomings, of the afforestation scheme during 1950-53. Beating up required in various stands ranged from 18 to 57%, the main causes of losses being: cockchafer (5.5%), damage by wild animals (3.3%), frost and fire (1.3%) and grazing (0.1%). For soil preparation, particularly on shallow or eroded sites, ploughing or trenching proved to be more suitable and economical than pitting. Complete preparation of soil, involving one or repeated ploughings and diskings, appeared indispensable on light grassland soils and in areas heavily infested with cockchafer larvae. Inadequate site selection and the neglect of proper manuring, soil disinfection and thinning, accounted for the poor nursery stock in many districts. Major improvements are required in the organization of seed collection, tending of trees and transplant beds, and selection of more suitable species for special conditions. *Populus 'canadensis'* should replace *P. robusta* in flood areas and Green Maple [sp.?] or American Ash [*F. americana*?] must not be used for beating up on sandy soils. Pine planting stock from local sources showed a survival twice as high as that from distant ones. Natural regeneration of Beech is suffering from both late and excessive opening of the canopy, and underplanting of Pine with Oak or Hornbeam is not progressing at a satisfactory rate.

2977. FODOR, G. Fafajmegválasztás homoktalajokon. [The choice of tree species for sandy soils.] *Erdészeti Tudományos Intézet Évkönyve, Budapest* 2, 1952 (1954), (143-52). [Hu.?] From *abstr. in Hung. agric. Rev.* 3 (3), 1954 (7). [E.] C.G.B.

Tests have shown that the soil hygroscopicity factor (hy) [cf. *For. Abstr.* 16 (No. 2741)] gives an adequate measure of the content of colloidal particles and of the water regime. In places in Hungary where $hy < 0.2\%$, sandy soils are not fit for afforestation; 0.3% is precarious, but up to 0.5% *Pinus nigra* var. *austriaca* and *P. sylvestris* stands of moderate growth can be raised. The quality of coniferous stands improves when hy becomes $> 5\%$. Most broadleaved tree species native to the Hungarian plain prefer soils with $hy = ca. 1.0\%$.

2978. BÉKY, A. Homokfásítás. [Afforestation of sands.] *Erdő* 3 (5), 1954 (147-50). [Hu.]

Success depends mainly on proper soil cultivation which must be done in the autumn preceding planting and should reach a depth of 50 cm. Species recommended, in addition to the most useful Robinia, are the White and Grey Poplar in preference to Black Poplar, Austrian Pine, and Norway Spruce in mixture with Hornbeam, which is excellently

suit for conditions in the Hungarian Plain. *Tilia argentea*, from its tolerance of high temperatures, is more suitable than other Limes and pure stands of *Pinus sylvestris* are inadvisable, being more liable to destruction by *Diprion pini* on sands than on forest soils.

2979. VÁRKONYI, L. Kiskunhalas környéki homoktalajok erdősitése. [Afforestation of sandy soils near Kiskunhalas.] *Erdő* 3 (5), 1954 (150-3). [Hu.]

The failure of earlier plantations on the fine calcareous sands carrying a scant vegetation of *Tortula ruralis*, *Fumana vulgaris* and *Alcama tinctoria* was due to the almost exclusive use of Robinia and 'improved' Poplars and to drought and shifting sand. On the basis of a soil survey, 70% of the 9000-ha. area is now being planted with Austrian Pine in mixture with Grey Poplar and some Black Poplar, 20% with Robinia, 'improved' Poplars, and Oak, and 10% with Scots Pine. Poplar is planted 1-2 years in advance of 2-year-old Pine, while Maple and Lime are used as fillers and a variety of shrubs (mainly Hawthorn, Juniper, Blackthorn and Elder) are used for stabilizing the sand. Plantations in well-prepared soil ploughed to 30-35 cm. are protected against shifting sand by straw mulch or artificial screens, especially the susceptible Pine seedlings, which are often planted among strips of rye. Since the soil may dry out to depths of 60 cm. before it can be covered by dense vegetation, moisture-conservation practices are followed for a period of 3-4 years.

2980. GAELJ, A. G., and DZJUBA, A. S. Obesenie bugristykh peskov prikaspiskoi polupustyni. [The afforestation of the sand dunes of the Caspian semi-desert.] *Lesn. Hoz.* 5 (6), 1952 (39-42). [Russ.]

Some 163 ha. of Pine, 5 ha. of Common Alder, 1 ha. of *Robinia pseudoacacia*, 3 ha. of Poplar and 16 ha. of *Elaeagnus* sp. are all that remain from the 1894-1916 afforestation of the Narynsk sand dunes in the Caspian semi-desert (Uralsk region). The plantations consist of scattered patches which, having been planted in wet years when the ground water stood at 50-60 cm. from the surface, managed to survive. The task now is to revise the policy of prohibiting clear felling and restricting thinnings for the sake of soil protection, and to give the Pine an urgently needed thinning to mitigate competition for nutrients and moisture. The hardwoods are decadent, but regeneration could be secured from coppice, e.g. after clear felling, as both Alder and *R. pseudoacacia* have been observed to coppice vigorously; selection felling failed to give regeneration as the coppice shoots are unable to develop under canopy.

2981. HÉDER, I. Dolomit és mészközpárokra telepített erdők hatásának vizsgálata és kiöregedő állományok felújítása. [Research on the influence of forests planted on dolomite and limestone barren lands and the regeneration of senescent stands.] *Erdész. Kutatás.*, Budapest No. 2, 1954 (87-101). 19 refs. [Hu.]

On a selected site, covered with shallow rendzina over dolomite and carrying 40- to 50-year-old stands of Austrian Pine, studies of the plant associa-

tions, microclimate, and soil conditions were conducted with a view to determining the effects of the forest and the possibilities of its artificial regeneration. It had caused no marked change in the plant associations, which still consisted mainly of *Festuca glauca*/Seseli leucospermum on the top of the mountain, *Carex humilis*/Chrysopogon gryllus and *Festuca sulcata-valesiaca* in the middle, and *Quercus pubescens*/Lithospermum purpureo-coeruleum on the lower third of the slope. The dense stands of Pine, however, gradually progressed from the lower third of the slope towards the middle zone, and the thin stands on the upper third of the plateau permitted the establishment of a dense grass cover. Temperatures decreased, and relative humidity increased under the forest cover. Condensed moisture in the rendzina with its admixture of debris suffices to support young trees, but older stands suffer from moisture deficiency due to the rapid desiccation of the soil, associated with the high Mg content of the rendzina, especially on wind-swept tops. This circumstance as well as considerable soil losses by run-off must be taken into consideration in the regeneration of stands at higher altitudes where conditions do not favour high crop densities.

Moisture conditions of the humus-carbonate soils may be improved by mixing them with small debris of weathered material and with clay or by applying a stone mulch. The top third of the plateau should be planted with shrubs tolerant to conditions of either shade or light, such as Rose and Hawthorn, in mixture with 30% Austrian Pine or with a mixed stand of Austrian Pine (70%) and *Fraxinus ornus* (15%). In the centre part, Austrian Pine with 30-40% shrubs is suitable for down-slope ridges and *Quercus pubescens* (80%), *Q. cerris* (10%), *Pyrus communis* and *Acer campestre* (10%) for the rest. The lower third of the slopes should be reserved for *Quercus pubescens*, *Q. sessiliflora*, *Acer platanoides*, *A. campestre* and *Sorbus aucuparia*. Regeneration in 50-year-old stands can be obtained by strip felling, starting at the top, in strips not wider than tree height on 20° slopes and 1½ times tree height on gentler slopes.

2982. HORVAT, A. Orijentaciona sjetva pri pošumljavanju degradiranog krša. [Trial sowing in the reforestation of the degraded karst areas.] *Šumarstvo* 7 (9/10), 1954 (502-8). 15 refs. [Croat. e.g.]

Supports the idea put forward by Vrdojčak [see *For. Abstr.* 16 (No. 1706)] of broadcasting seed of many species on such areas, as a preliminary test of their chances of survival and suitability.

2983. KUBÁŠAK, A. Zalesňovanie vysokohorských holín. [Afforestation of denuded sites in mountain regions.] *Les, Bratislava* 1 (11), 1954 (15-8). [Slovak.]

Includes some figures relating to afforestation (planting, sowing) during the period 1949-53 in the Slovakian forest ranges of Zuberec and Zverovka (Norway Spruce, Larch, *Pinus mugo*), and some data relating to germination and development of nursery seedlings of *Larix sibirica* and *L. decidua*.

2984. ŠUMAKOV, V. S. O forme dubovyh nasaždenij na kaštanovyh i svetlokaštanovyh

počvah. [The form of Oak plantations on chestnut and light chestnut soils.] *Lesn. Hoz.* 5 (5), 1952 (45-8). [Russ.]

The main difficulty in afforesting the chestnut soils of the arid steppes of Stalingrad, Rostov and Astrakhan Provinces is an acute shortage of moisture accessible to tree roots. The climate being continental, 60 to 70% of the annual rainfall occurs during the summer months and evaporates before it can be absorbed into the soil; and trees have to rely chiefly on the moisture stored during the thaw. This has been found to be highest on the eastern margin of the forests, where the prevailing E. winds heap the snow. Both in the open steppe and within the forest itself the accumulated water is considerably less in amount. Accessible supplies at the end of May, 1950 in the top 2 m. of the dark-chestnut heavy clay-loam of the Sal'sk forest were:— (1) open steppe, 69.5 mm.; (2) eastern forest margin, 167.9 mm.; (3) within the forest, 75 m. from the margin, 60.7 mm. On the basis of this and similar evidence from other localities, the author recommends afforesting the steppes in these provinces not in large solid blocks but by planting Oak in strips 50-60 m. wide with interspaces of 300 m., open to the E. winds, which could be converted into meadows.

2985. LEIBUNDGUT, H. [On problems of silviculture in the afforestation of arid zones.] *Hayaar* No. 4, 1955 (24-9, III-IV). 6 refs. [Heb.e.]

A discussion of general problems and necessary lines of research.

2986. ZOHARY, M. [Ecology of afforestation in the Negev.] *Hayaar* No. 4, 1955 (30-5, IV-V). [Heb.e.]

Success in afforestation of the sand dunes of the Negev depends largely on spacing. Tamarisk planted at a density of 200/dunam develop rapidly during the first few years, owing to the initially high water storage of the dune, but once that is exhausted the young trees become wholly dependent on the current year's rainfall, which amounts to 100 cu.m./dunam. Since a Tamarisk tree of 20-25 cm. diam., 3-4 m. height, and bearing 12 kg. of foliage transpires 30 cu.m. of water per annum, only 3-5 plants/dunam can develop into trees of commercial value on this water supply. Owing to its relatively high water consumption, Tamarisk should perhaps be replaced by Pine, Carob, or even Olives, which are more economical in their transpiration rates and may be planted 2-3 times as close.

2987. KARSCHON, R. [Soils and possibilities of afforestation in the Rotem valley.] *Hayaar* No. 4, 1955 (34-8, V). [Heb.e.]

A survey showed two habitats—*Retama raetama*/ *Anabasis articulata* association on reddish-yellow sandy soil, and *Zygophyllum dumosum* on saline *hammada*. The former is suitable for afforestation (windbreaks along roads, small woodlots etc.) with *Acacia cyanophylla* and *Tamarix articulata*.

2988. WOUT, B. D. VAN'T. Factors affecting the growth of exotic conifers in the Taupo pumice country. *New Zealand Science Review*, Wellington 11 (4), 1953 (45-9). 13 refs. N.Z.H.

Since indigenous New Zealand plants have been found to have indicator value for site quality for conifers [cf. *For. Abstr.* 13 (No. 535)], the development of such plants in forest sites on pumice in the Taupo area was studied. It was found that the slow advance, first of grasses and then of shrubs, from the margins inward was accompanied by an improvement in the soil conditions. The difficulty in establishing conifers on these sites is considered to be related to the interaction of adverse microclimate and poor soil; these might be overcome by initial plantings, giving a poor yield but improving soil and microclimate, followed by final plantings leaving as dense a growth of the initial plantings as possible. Adverse conditions are likely to recur if clear felling takes place. Planting should be avoided in areas where the hardpan cannot be broken up by a giant disc or other implements. Local variations in site quality are probably due to differences in the degree of weathering in the ash deposits, and effects of differences in altitude and microclimate.

2989. THORBY, R. G. Afforestation in the Cook Islands. *Quarterly Bulletin, South Pacific Commission*, New Caledonia 4 (4), 1954 (15-6). From *abstr. in Trop. Abstr.* 10 (2), 1955 (64). E.M.B.

On Atiu and Rarotonga yearly burning and the resultant erosion are destroying thousands of acres of land. Since 1951, however, 40 acres have been planted, primarily with *Albizia falcata*, to be used as crate wood. *Eucalyptus* and *Acacia* spp. have given encouraging results and many other species are being tried. [Cf. *For. Abstr.* 15 (No. 4401).]

235. Underplanting, Advance Planting etc.
Nurses and Formation of Mixtures.

Interplanting of Inferior Growth

See also Nos. 2756, 2769, 2825-6, 2854, 2946-7, 3022.

2990. WAGENKNECHT. Unterbau und Voranbau. [Underplanting and advance planting.] *Wald* 2 (2), 1952 (37-43). [G.]

An exposition, in general terms, of aims and methods in both, discussing *inter alia* the role of underplanting for soil protection, production of clear boles, increased yield, protection against insect outbreaks, and conversion of stands, as well as suitable species, soil preparation, spacing, establishment, and age of the stand to be underplanted; and, under advance planting, its distinctive uses, e.g. in restocking clear fellings on poor sites. Species discussed include Beech and Red Oak under Scots Pine; Hornbeam, especially under Oak; Norway Spruce, Douglas Fir and Silver Fir. Photos show Beech under Pine of various ages, and Douglas Fir under Pine, from the Instructional Forest at Eberswalde.

2991. LESZNYÁK, J. A debreceni erdőpuszták faállományá-talakitási problémái. [Regeneration problems on the 'forested heaths' near Debrecen.] *Erdő* 3 (5), 1954 (154-60). [Hu.]

Changes in microclimate and soils brought about by extensive drainage, breaking up of grassland, and mismanagement, have led to the disappearance of the Oak forest near Debrecen and to the formation of

'forested heaths' populated by poor stands of Robinia, Pine, and Birch, interspersed with shrubs and waterlogged meadows. An attempt is being made to regenerate 10,000 ha. of such land by underplanting Pine on chernozem-type soils (40%), Oak on soils in moist flats (25%), Robinia on dry sands (25%) and a few other species at various places (10%). Scots or Austrian Pine in areas covered with the *Festuca vaginata* association, is planted in mixture with Grey Poplar and *Celtis [australis?]*. Oak on more fertile soils is mixed with Ash and some Elm, Maple, Lime, Hornbeam, Wild Cherry and *Pyrus communis*; in drier habitats, *Pinus sylvestris* and *Tilia argentea* are substituted for Ash, Maple and Hornbeam. The mixtures suitable for dry sands consist of Robinia (40-70%), Scots Pine (20-40%), and *Tilia argentea* (10-20%). The most fertile soils should be reserved for Poplar, while *Alnus glutinosa* and White Ash may be planted in waterlogged places.

2992. Comment reboiser: techniques de l'enrichissement. [Reforestation: techniques of stand improvement.] *Étud. Com. consult. Rebois., Paris* No. 4, 1953. pp. 14 + 1 tbl. [F.]

Advice on the introduction and substitution of superior species.

2993. RENIER, H. J. L'aménagement des forêts naturelles au Kasai et au Ruanda. [Management of the natural forests of Kasai and Ruanda.] *Bull. agric. Congo belge* 45 (6), 1954 (1473-98). [F.flem.] [Paper presented at the 4th World Forest Congress at Dehra Dun, Dec. 1954.]

Gives a map of the forest zones in the Kasai Province on the Angola border, with data on rainfall and the composition and production per ha. in 3 utilization categories of the moist semi-deciduous forest, and describes the work done since 1951 in enriching exploited forest. All timber and fuel wood is taken out. Stumps, potted plants and striplings (90% *Terminalia superba* and *Chlorophora excelsa*) are planted at 10-m. spacing. The *Chlorophora* is dusted fortnightly against *Phytolyma* with Folidol E605 Bayer (parathion-based) until 5-6 m. high. The costs (80-85 man-days including dusting) of this successful work are richly repaid by the estimated final yield of 200 cu.m./ha., since logs felled and cross-cut fetch Fr. 700-800/cu.m. Where fuel is not saleable, clearing, burning and girdling is resorted to. Similar data are given for the climate, composition and production of the montane forests of Ruanda, where regeneration is good but too expensive to bring on. Clear-felling and planting to exotics (*Cupressus* spp.) is indicated by local success.

236. Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)

See Nos. 2738, 2946, 2950, 3241.

237. Amelioration of Forest Sites

See also Nos. 3095-6, 3132.

2994. SEROV, I. I. Sposoby proizvodstva lesokul'tur na plovčadiah s izbytočnym uvlažneniem. [Planting of waterlogged ground.] *Lesn. Hoz.* 5 (7), 1952 (92). [Russ.]

A note on results of ploughing, instead of draining, waterlogged felled areas (Rybinsk leskhoz, autumn 1938) and planting with 2-year-old Scots Pine on the weathered tops of strips, each formed by two furrow slices, in spring 1939. The plantation was untended for 10 years, and the Pine was then (1949) freed as necessary. The stand could then be described as Pine/Birch with Pine dominating (mean diam. 3.0 cm., ht. 3.5 m.). By contrast, the adjoining undrained areas were waterlogged and carried only sparse, poor Birch, occasional Pine and isolated Spruce and Willow.

2995. OLSON, D. F., JR., COOPER, R. W., SANDS, N. E., and KROCK, S. Drainage can create new Slash Pine sites. *Sth. Lumberm.* 189 (2369), 1954 (112-4).

In 1947, 1700 acres of swamp occupied by Swamp Cypress, hardwood and brushwood in the Altama plantation, Glynn county, Georgia, were drained by constructing a 3-mile ditch. Natural regeneration of Slash Pine, mostly established in 1948, was satisfactory in the first 100 ft. from the seed source, was suitable for low and medium intensity of management at 100-250 ft. and unsatisfactory beyond 250 ft. In small plots near a seed source 2000 seedlings/acre were established where hardwood competition was sparse and only 500 where it was severe. Survival of Slash Pine planted on 2 acres in 1947-48 was good, d.b.h. and ht. after 6 growing seasons averaging 1.6 in. and 9.5 ft. respectively, but many of the trees appeared to be shallow-rooted.

2996. Specialnummer om växtnäringstillförsel i skog. [Special number on the addition of plant nutrients in forestry.] *Växt-Närings-Nytt, Stockholm* 2 (10), 1954. pp. 71. [Sw.] H.S.B.

Contains the following papers, all in Swedish: Using fertilizers on forest soils [: a review] (*E. Björkman*); Some forest fertilizer experiments: preliminary reports (*S. Karlberg*); Swedish investigations on nutrient conditions in the forest (*C. O. Tamm*); Can commercial fertilizers profitably be used in forestry? [an account of German investigations] (*R. Themlitz*); The use of fertilizers in forest nurseries in Scotland (*A. B. Stewart*); The use of fertilizers in forestry in Great Britain (*J. W. L. Zehetmayr*); Measuring diameter increment of trees with a microdendrometer (*S. Karlberg*); German practice in using fertilizers in forestry (*H. Barth*); Reports on some Danish research on the use of fertilizers on heathland (*E. Oksbjerg*); Research on the use of fertilizers in forestry at Aske (*S. Lagerroth*); The fertility of forest soils in Finland (*P. J. Viro*); The use of fertilizers on forest sites in Norway [: preliminary research] (*R. Obel*); The use of fertilizers in forests [at Sokna, Norway] (*E. Berg*); Saltpetre as a fertilizer in forests on poor sandy soils [in Norway] (*T. Rognerud*); and The importance of P nutrients in forestry [: a review] (*H. Glathe*).

2997. GALOUX, A. La fertilisation minérale en sylviculture. [The use of mineral fertilizers in forestry.] *Trav. Sta. Rech. Groenendaal (Sér. B)* No. 16, 1954. pp. 62 + 1 photo. 22 refs. [F.]

Reviews a number of experiments carried out in Belgium during the past 50 years on the use of P, K and Ca fertilizers in Scots Pine and Norway Spruce plantations, summarizes the results, discusses the economic aspect, and concludes that the effect of fertilizers on increment will more than repay the cost of their use on poor soils. [Cf. *For. Abstr.* 15 (No. 238).]

2998. Fertiliser experiments. *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (19-20).

[Cf. *For. Abstr.* 15 (No. 1347).] Further data are given on the response in height growth of *Acacia decurrens* var. *mollissima*, when fertilizers are applied within 3-6 months of germination. Phosphate, the only treatment showing significant improvement on all sites, tends to decrease in effect with lapse of time (5-6 years), whereas the effect of Ca tends to improve.

238. Timber Plantation Crops requiring Special Treatment

See also Nos. 2717, 2867.

2999. G., H. Richtlinien für den Pappelanbau durch die Landschaftspflege. [Directives for the planting of Poplars under the 'Landschaftspflege' organization.] *Wald* 2 (4), 1952 (102-5). [G.]

Covers recommendations on planting, site selection and choice of species, tending and primary conversion in E. Germany.

3000. MAGYAR, J. Nyárasok fatermése, szerkezete és korszerű nevelése. [Yield, structure and modern tending of Poplar stands.] *Erdész. Kutatás., Budapest* No. 2, 1954 (3-64). 12 refs. [Hu.]

Results of investigations on the possibility of increased Poplar production in Hungary can be summarized as follows: top height is the most suitable criterion of site quality in Poplar stands; a significant correlation exists between age and top height, and between these and total timber volume; for a given age and site quality, the latter is greater for pure Poplar stands than for those mixed with light-demanding species; if the main goal is to obtain the largest volume yield, then Poplar plantations should be single-storeyed and pure.

24. TENDING OF STANDS AND TREES

See also Nos. 2818, 3557.

3001. MAJER, A. Körösvészély. [The Ash invasion] menace [in Hungary].] *Erdő* 3 (4), 1954 (106-14). [Hu.]

Fraxinus excelsior is shown to advance at the expense of Beech stands in the Börzsömy and Bükk mountains and especially in the Bakony forest. Most exposed to the primary invasion are mountain slopes and valley bottoms with zones of transition between *rendzina* on débris carrying Ash/Lime/Maple communities and brown forest soils supporting Beech, provided the habitats are sufficiently moist, as indicated by the dominance of a *Mercurialis perennis*/Lamium galeobdolon/Aegopodium podagraria/Geranium robertianum association. The only effective means of control in these areas is by maintaining a dense tree canopy which deprives the Ash saplings of adequate moisture and light. From pure stands of Beech in drier habitats, characterized

by an *Asperula odorata*/Carex pilosa ground flora, mature Ash stems should be removed before opening the canopy; saplings ought possibly to be cut out and clear felling of Beech must be avoided. Dry and acid sites characterized by a ground flora of *Luzula albidula* and *Vaccinium myrtillus* do not favour the establishment of Ash, but dry stands of Beech may be invaded by *F. ornus*. Though a secondary succession of Ash may lead in a few decades to soil degradation through decreased litter production and invasion by undesirable grasses and weeds, established stands of this species can be utilized as pioneers to which Beech can succeed. This is effected by underplanting 20- to 30-year-old stands with Maple and Hornbeam in mixture with 5-10% Beech.

241. Cleanings

See also Nos. 2749, 2755.

3002. SOMOGYI, Z. Állományápolások a gyertyán megfelelő elegyarányának kialakítására. [Cultural operations for ensuring a suitable proportion of Hornbeam in mixed stands.] *Erdő* 3 (5), 1954 (174-5). [Hu.]

Selective felling of seed trees and judicious removal of saplings [coppice?] for about 10 years after clear cutting are the practice in Hungary for keeping Hornbeam growth within reasonable limits in Oak and Beech stands. Annual pruning and lopping, especially during the period of vigorous sap circulation checks regrowth, and the resulting thickets provide good protection for the more valuable species against game. Group planting of *Abies alba* gave promising results in regenerating Beech in stands where Hornbeam had been brought under control.

242. Thinnings

See also Nos. 2749, 2755, 2849, 2882, 3119, 3241, 3290, 3325, 3472, 3573.

3003. HILEY, W. E., and LEHTPERE, R. Thinning grades based on the thickness of annual rings. *Forestry* 28 (1), 1955 (17-32). 11 refs.

A new method is propounded of calculating numerical thinning schedules for conifers, designed to give, on the average, any reasonable pattern of ring width at breast height in the 100 largest trees in a plantation. It starts from the Forestry Commission's Revised Yield Tables for Conifers in Great Britain and is based on the principle that, if the c.a.i. of a plantation is unaffected by the grade of thinning, the ring widths must be inversely proportional to the bole area per acre, i.e. to the total area of cambium on the main stems. Sources of error in the method of calculation are discussed, which, it is considered, are not so serious as to endanger the use of the method as for calculating approximate thinning schedules. As an approximate yield table can be constructed for each thinning grade, the method can be used to estimate the relative costs of growing trees of various diameters with various ring width patterns. From authors' summary.

3004. CHOW, C., and YANG, Y.-C. Thinning experiment in a *Cryptomeria* stand. *Memoirs of the*

College of Agriculture, National Taiwan University, Taipei 3 (2), 1953 (1-15 + 1 tbl.). [E.chin.] C.G.B.

Presents data illustrating the development of a *C. japonica* plantation, ca. site quality I, when subjected to 4 different kinds of thinning (based on Terazaki's crown classes with 3 plots differing by grade, and one in method) at 11 and 16 years. Plots were each ca. $\frac{1}{30}$ th ha., without replication.

3005. ASSMANN, E. Grundflächenhaltung und Zuwachsleistung bayrischer Fichten-Durchforstungsreihen. [Basal area and increment in Norway Spruce trial thinning series in Bavaria.] *Forstwiss Cbl.* 73 (9/10), 1954 (257-71). [G.]

Presents data taken from the long-standing Spruce thinning-trial series of the Forstliche Forschungsanstalt, Munich, to illustrate relationships between basal area and increment. [Cf. *For. Abstr.* 14 (No. 3359).]

3006. RALSTON, R. A. Timing and yields of first commercial thinnings in Red Pine plantations. *Tech. Note Lake St. For. Exp. Sta.* No. 420, 1954. pp. 1.

A study of recent pulpwood thinning operations on 3 Lower Michigan Red Pine plantations indicated that: (1) the better the site the earlier a commercial thinning is feasible, and (2) close spacings (5×5 ft.), especially on poorer sites, do not permit commercial operations when thinning is necessary silviculturally. Guides for initial thinnings are given.

3007. HEIBERG, S. O., and HADDOCK, P. G. A method of thinning and forecast of yield in Douglas Fir. *J. For.* 53 (1), 1955 (10-8). 40 refs.

Data from Europe and the Pacific Northwest are used in a proposed thinning schedule and yield forecast for Douglas Fir on good sites (index, 150). Basal area is maintained, at 115-142 sq. ft./acre by 13 thinnings between the 28th and 85th year, during which stems are reduced from 735 to 47. From a value-increment chart, it is concluded that with minimum interest earning at 4% and fastest growth at 6 rings/radial in. (plywood standard) trees cannot be held to more than 22-23 in. mean d.b.h., corresponding to 80-85 years. Managed as suggested, volume and value production in 85 years are respectively 39 and 54% more than in unmanaged stands, an advantage further enhanced if higher quality, lower working capital and easier logging are considered.

3008. [Thinning of *Acacia decurrens* var. *mollissima*.] *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (13).

[Cf. *For. Abstr.* 15 (No. 1626).] Thinning experiments in 3 different localities: In Expt. No. S5 at 2 years no significant difference was found in the growth of dominants at any density from 400-1400/acre; in S3 at 3 years trees at ≥ 700 /acre were significantly suppressed when compared with those at ≤ 600 ; in S1 at $5\frac{1}{2}$ years, densities of ≥ 650 were significantly suppressed compared with ≤ 500 .

In S8 (Bloemendal) after final thinning to 500/acre at 2 years, the 3 plots subjected to different thinning treatments showed no significant difference in mean d.b.h.

243. Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)

See also Nos. 2837-8, 3115, 3118-9.

3009. GILLMOR, L. G., and JONES, F. W. Growth of pole-size *Ponderosa* on cutover land in relation to selection of trees for pruning. *Res. Note Pacif. Northwest. For. Range Exp. Sta.* No. 101, 1954. pp. 2. 1 ref.

A study in the Fremont National Forest has shown that diameter growth more than doubled after partial cutting of old-growth trees and that the average increase was sufficient to warrant pruning. Analysis of a 'release index' (b.a. of all stumps within 40 ft. of each selected tree, divided by the sum of the distances (ft.) between tree and stumps) showed that on average growth response was greater when the index was higher, but that wide variation made it unreliable for selecting individual trees.

3010. FURNIVAL, G. M. Deadening [killing] culls in bottomland hardwood stands. *Sth. Lumberm.* 186 (2369), 1954 (123-4).

In experiments by the Delta Research Centre, 2 years after treatment 83% of trees treated with 2,4,5-T, 82% of those treated with NH_4 sulphamate and 89% of those notch-girdled were dead. Thin-barked species were more easily killed. Swamp Privet [*Forestiera acuminata*] was the only species giving unsatisfactory results. Equations for estimating cost per acre are given.

3011. GRANO, C. X. Girdle your weed trees in the spring. *For. Fmr.* 14 (4), 1955 (6, 16).

Trees of Red Oak [*Quercus rubra*] and Post Oak [*Q. stellata*] in Crossett Experimental Forest, Arkansas, were girdled at monthly intervals during the dormant season and at fortnightly intervals during the growing season. Spring girdling was most successful for both species, particularly in preventing coppice regrowth.

245. Tending of Trees, Pruning etc.

See also Nos. 2849, 3009, 3069.

3012. Pruning [of *Cupressus lusitanica*]. *Rep. For. Dep. Kenya* 1951-53, 1954 (21-2).

Data on the length of the growing season and on the occlusion rate of pruning scars in young crops of various ages (2-7 years) in relation to attack by *Oemida gahani*, and of the effect of pruning on increment at these ages.

3013. RAZUMOV, V. P. Primenenie obrezki sučjev dlja ulučšenija kačestva drevesiny sosny. [Pruning as a means of improving the quality of Scots Pine.] *Lesn. Hoz.* 5 (7), 1952 (30-7). [Russ.]

Report on a 1935-40 experiment on ca. 0.025 ha. plots [no replications] laid out in Pine [age and density unspecified] in Bryansk district with (1) dry pruning only; and green pruning (2) of $\frac{1}{3}$ and (3) of $\frac{2}{3}$ of the green branches. Increment $\frac{1}{3}$ analysis showed that (a) natural mortality was smaller, (b) height, b.a. and volume increment were higher on green- than on unpruned plots, and highest in (2).

3014. Effect of season of green pruning upon disease incidence [in *Acacia decurrens* var. *mollissima*]. *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (15).

The mortality, gummosis and wood rot in plots pruned to 8 ft. at the end of March, May, July, September, November and January show highly significant differences in favour of July pruning and against the season January–April.

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS See also Nos. 2991–2.

3015. WILLIAMS, D. N., and CHAPMAN, S. The clear felling of an Oak scrub area. *J. Land Agents' Soc.* 54 (2), 1955 (72–4 + 2 photos).

Describes the felling and clearing of an area of 4 acres of worn-out Oak coppice stools with some Birch and Rowan on a steep slope at Dunster (Somerset). The operation was carried out in late April and early May, so as to take advantage of stripping the bark, which has a ready sale for tanning. Quantities and values of posts, firewood, bark etc., extracted, and expenditure are detailed. Excluding overheads, the value of produce obtained exceeded expenditure by £117. 10s. 10d.

26. COMBINATIONS OF FORESTRY WITH AGRICULTURE AND PASTORAL HUSBANDRY (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

261. Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land

See also No. 3681.

3016. Essais culturaux. [Field cultivation experiments.] *Rapp. Inst. nat. Étude agron. Congo belge* 1953, 1954 (301–2). [F.]

Notes on current experiments at Bembesa. It appears that 4 years' forest fallow is insufficient to restore fertility after 3 years' cropping. The effect of 2 years' cropping followed by 4, 6, 9 or 12 years' fallow are being studied. Burning and destruction of the tree stools by fire is being compared with burning without such destruction.

3017. HARGOT, F. Monographie agricole du Maniema. [The agriculture of Manyema.] *Bull. agric. Congo belge* 46 (1), 1955 (1–56 + 2 maps). 15 refs. [F.flem.]

Describes with diagrams a modification of the corridor system of shifting cultivation in which there is a central strip of bananas down the length of the cultivated belt. Other details of shifting cultivation and vegetation are included.

264. Farm Forests

See No. 3557.

266. Shelterbelts, Windbreaks

See also Nos. 2946–51, 2984.

3018. [Studies on fog-prevention forest (Volume IV).] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 1, 1954. pp. 299. [Jap.e.]

[Cf. *For. Abstr.* 16 (No. 50).] The bulletin comprises 25 papers, most of which have English summaries, in the sections meteorological, physical, and agricultural and forestry. Many of the papers are based on studies over the past 4 years at the Institute of Low Temperature Science, Hokkaido University, and others on observations over the same period in forests on the coast at Ochiiski and Akkeshi. Papers of more specifically forestry interest include the following: On the capture of fog particles by the forest (III) (*H. Oura*; pp. 50–63; 8 refs.); On the fog water-content in the neighbourhood of a forest (*T. Tabata*, *T. Huzioka*, and *N. Matsumura*; pp. 68–75; 6 refs.); Air temperatures in fog-preventing forest (*S. Kinoshita* and *K. Yanagi*; pp. 76–84; 4 refs.); An approximate estimate of the total relative decrease in fog water-content caused by the capture [of fog particles] by a series of forest belts (*T. Fukutomi*; pp. 110–20; 8 refs.); A comparison of fog moisture [amounts] captured by various tree species (*T. Kashiwaga*, *K. Kitamura*, and *K. Takahashi*; pp. 123–30; 14 refs.); Meteorological conditions [soil and air temperature] to windward and leeward of a windbreak (*S. Onodera*, and *M. Ishikawa*; pp. 131–43; 3 refs.); The amount of fog water dripping from Larch forests (*M. Ishikawa*; pp. 144–51; 4 refs.); Phytosociological study on forests in districts influenced by sea fog (*M. Tatekawi*, *M. Nakano*, and *H. Yamamoto*; pp. 167–204); Stand composition and growth of forests [Oak, Birch and Larch] in sea-fog districts (*Z. Matsui*; pp. 205–46); The growth of Todo-Fir and Larch in districts influenced by sea fog (*I. Takato*, *M. Nakano*, and *H. Yamamoto*; pp. 247–64; 2 refs.); The influence of fog-preventing forest on temperature (*K. Konda*, *N. Murai*, and *S. Taniguchi*; pp. 267–82); and Light intensity in and around forest sites in sea-fog areas, and the influence of environmental factors (*Y. Harada*; pp. 283–93; 7 refs.).

3019. SENKEVIČ, A. A., and MOGILKO, N. V. O rusloobrazujuščej roli nasaždenij zaščitnyh lesnyh polos. [The role of shelterbelts in regulating river channels.] *Lesn. Hoz.* 5 (5), 1952 (19–23). [Russ.]

A method for preventing the silting up of river beds, now under trial on a reach of the Vyatka by the Ministry of the River Fleet of the U.S.S.R., will, if successful, eliminate costly dredging. This is to plant parts of the flood plain adjacent to the river with belts of trees and shrubs sufficiently closely to slow the current and divert deposition from the main stream to the sides. The author presents a formula for calculating the width of the channel to be kept free and from it the width of the belts necessary along the banks.

3020. FLOROVSKIĖ, A. M. Dub, jasen i gliedičija v polezaščitnyh polosah na juže Ukrainy. [Oak, Ash and *Gleditsia triacanthos* in the shelterbelts of the southern Ukraine.] *Lesn. Hoz.* 5 (6), 1952 (34–8). [Russ.]

A comparison of the rates of growth of these species in the region (continental climate; soil a southern chernozem of good structure over a heavy clayey loess) showed that *Gleditsia*, being a light-demander, should be planted only in the 3 or 4 outside rows, and the middle rows should have less

light-demanding species (Ash, *Acer tataricum*, *A. platanoides*) in mixture with Oak, the proportion of which should also be increased. Under steppe conditions Ash shows low resistance to insect attack, especially when planted in the outer rows, and to late frosts. Its proportion should therefore be reduced to 15–20% and it should be confined to the middle rows, or the more drought-hardy Green Ash [*F. pennsylvanica*?] should be substituted.

3021. NARZIKULOV, M. N. Vvodit' li beluju akaciju v polezaščitnye lesnye nasaždenija. [Should *Robinia pseudoacacia* be planted in shelterbelts?] *Lesn. Hoz.* 5 (5), 1952 (49). [Russ.]

The view that *Robinia* is unsuitable for planting in cotton-growing regions because it is a host of the 'black lucerne aphid' [*Aphis craccivora*?] which also attacks cotton, needs to be modified. In Tadzhikistan this aphid, after overwintering on perennial leguminous herbs, migrates simultaneously to both cotton and *Robinia*, remaining on the former only up to 20–24 June and on the latter as late as mid-July or early August. It has been noted that after the aphid leaves the cotton, its attacks on *Robinia* become severe, and it is inferred that this is due to migration from the cotton. Attacks on cotton are not severe where stands of *Robinia* with abundant sucker growth exist near by. At the end of July the aphids start migrating from *Robinia* to leguminous herbs. Since *Robinia* is a preferred host which appears to attract the aphid away from the cotton, it can be safely planted in this region. In the cotton-growing regions of European Russia, however, cotton is sown considerably later and there may be a risk of the aphid migrating from *Robinia* to the young cotton shoots.

3022. VAHRUŠIN, G. S. Sozdanie snegozaščitnyh polos s učastiem eli v lestepnyh raionah Omskoj oblasti. [Raising Spruce in shelterbelts against snow-drifts in the forest-steppe zone of the Omsk region.] *Lesn. Hoz.* 5 (6), 1952 (51–2). [Russ.]

Trial plantings of Spruce to protect the Omsk railway from snow drift (1933) were kept in check by unsuitable growth conditions, namely, great temperature extremes (Jan., mean -20°C ., min. -50° ; July mean $+20^{\circ}$, max. $+45^{\circ}$), insufficient soil moisture (annual rainfall 300–350 mm., of which 150 mm. falls in the three summer months) and exposure to dry south and cold north winds. A successful method for stimulating growth of the Spruce was found in planting fast-growing deciduous trees and shrubs (*Robinia pseudoacacia*, *Amelanchier* sp., *Lonicera* sp., *Acer* sp., *Pyrus baccata*), 5 years after the establishment of the Spruce, in strips 10–20 m. wide along both sides of the Spruce belt. These species protected the Spruce and increased soil moisture, both by contributing to the accumulation of snow and by retarding its melting, so that the Spruce put on shoots measuring 12–20 cm. each year.

3023. Perdelele de protecție a culturilor agricole. [Shelterbelts for agricultural crops.] Ministerul Agriculturii, Direcția Învățământului Agricol, Bucharest. No. C.570/1953, 1953. pp. 231. 44 refs. [Rum.]

An elementary manual designed for use in training

schools for forest rangers and soil conservationists of a similar grade.

3024. LUPE, I. Perdele forestiere de protecție și cultura lor în câmpiile republicii populare române. [Forest shelterbelts and their cultivation on the plains of the Rumanian People's Republic.] Editura Academiei Republicii Populare Române, Bucharest. 1952. . pp. 269 + 2 maps. 201 refs. [Rum.]

A comprehensive study, including the results of research on the effects of shelterbelts on light, wind, air temperature and humidity, evaporation and snow regime, soil, and crop yields; shelterbelts as a source of wood and other products; choice of species, preparation, planting and tending; lay-out of shelterbelt systems, and discussion of regions of Rumania where they are necessary.

268. Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.

See also Nos. 2622, 2788.

3025. VAKHCHOURI [WAKHSHŪRĪ], I. [Some notes about the pastures of Northwestern and North-eastern regions of Iran.] *Mon. Bull. Iran For. Serv.* 5 (5/6), 1954 (22–6). [Per.]

Some account of Persian pasturelands which the author divides into 3 categories. Those surrounded by or lying below forest are sufficiently under forest departmental control to be saved from serious deterioration. Those situated on high ground above the forest zone, as in the Elburz mountains, Azerbaijan or Khurasan, give cause for concern, as illicit grazing is difficult to control. Various ameliorative measures are suggested and the great potentialities of the Mughan plain, on the Caspian littoral, provided that windbreaks can be established, are stressed.

3026. Le comité marocain des herbages et de la production fourragère. [Pasture and forage committee of Morocco.] *Terre maroc.* No. 302, 1955 (3). [F.] E.M.B.

Gives the terms of reference, composition and meetings of this committee in 1953–54. Formed under the recommendations of the Mediterranean basin conference (O.E.E.C. 1951) the object is to coordinate research by the specialists concerned (forest grazing included).

3027. CAMPBELL, R. S. Fire in relation to forest grazing. *Unasylva* 8 (4), 1954 (154–8). 36 refs.

A general discussion with some literature references.

3028. HARRIS, R. W. Fluctuations in forage utilization on Ponderosa Pine ranges in eastern Oregon. *Repr. from Journal of Range Management, Baltimore* 7 (6), 1954 (250–5). 6 refs.

Wide fluctuations from year to year make it necessary to strike an average over several years in order to estimate stocking rates. Forage on timbered range types was used less than that on grasslands.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

3029. POURTET, J., and TURPIN, P. Catalogue des espèces cultivées dans l'Arboretum des Barres.

Première partie: Gymnospermes. [Catalogue of the cultivated species in the Arboretum of Les Barres. I. The Gymnospermes.] *Ann. Éc. Eaux For. Nancy* 9 (1), (2nd ed. rev.) 1954. pp. 254 + 16 plates + map. [F.]

The first edition appeared in 1944 [cf. *For. Abstr.* 8 (No. 171)] and the revised edition, while including new species and making some changes in nomenclature, follows it closely.

3030. RAIZADA, M. B., and HINGORANI, G. R. A list of plants grown in the arboretum and botanical garden of the Forest Research Institute, New Forest, Dehra Dun. Government of India Press, Calcutta. 1954. pp. 49 + plan.

Listed alphabetically by scientific name, with origin, present condition, season of flower and/or fruit, and location. There is an index to families.

28. HUSBANDRY OF FOREST PRODUCTS

OTHER THAN WOOD

See also section 892.

282. Bark Crops

See Nos. 2623, 2686, 2758, 2870, 2998, 3008, 3014, 3169, 3189, 3241.

283. Fruit and Seed Crops

See also Nos. 2678-9.

3031. KADAMBI, K., and DABRAL, S. N. The silviculture of *Ricinus communis* Linn. *Indian For.* 81 (1), 1955 (53-8 + 3 plates).

Includes tabulated data on seed storage and germination, yield of seed per tree and oil content of seeds, and increment, and discusses possible use as pulpwood.

284. Crops Tapped for Exudates

See also Nos. 2650, 3602, 3607.

3032. TOLKAČEV, A. K., and SINELOBOV, M. A. Intensivnyi metod podsočki eli. [Intensive tapping method for Spruce.] *Derev. lesnim. Prom.* 3 (12), 1954 (12-3). 3 refs. [Russ.] P.R.

The yield of crude resin from Spruce depends in the first place on the perimeter of the wound, not its area. Resin secretion, according to A. N. Šaternikova (in *Sbornik Trudov CNILH*, Leningrad, Goslestehizdat, 1940), begins 3-4 weeks after wounding, when the callus appears in the wound; these calluses are the sources of the resin. The resin flow can originate in: (1) a special parenchymatous glandular tissue at the base of the calluses, and (2) pathological resin ducts developing in large quantities in the new growth-rings and forming a kind of network; when the callus tissues and the wood itself begin to disintegrate in resin, an intense resin flow sets in. In order to prevent the possibility of fungal infection, to which wounded Spruce stems are very susceptible, the author suggests only one season's tapping (before felling). All the bark is removed early in summer from the lowest part of the stem up to a height of 1.2-1.4 m., and crude resin is collected only once from the barked stem portion 2-3 months later. The mean resin yield from trees of 27-42 cm. diam. [b.h.?] was 455 g.

The resin collected had a very low % (0-92) of impurities and a turpentine-oil content of 11.5%.

3033. MERGEN, F. Inheritance of oleoresin yield in Slash Pine. *Naval Stores Rev.* 64 (9), 1954 (8-9, 20).

A progeny test just completed shows that ability to yield resin is an inherited characteristic in *Pinus elliotii*. Yields obtained from seedlings from the controlled and open pollination programme of 1943-44 were highest from controlled crosses between high-yielding parents. Progeny from wind pollination of high-yielding parents gave yields lower than those from the controlled crosses, but still higher than those from average parents. When the mother trees had resin of high viscosity the average viscosity for the F_2 generation was also high. An analysis of data from one tree control-pollinated with pollen of 4 different trees showed that crossing with a tree having low viscosity caused a decrease of viscosity in the progeny.

3034. DUDIĆ, M. Povećanje prinosa borove smole pomoću smeše hlоровodične kiseline: kalcijum hlorigida. [Increasing Pine resin yields by using a mixture of HCl and $CaCl_2$.] *Šumarstvo* 7 (11/12), 1954 (618-25). 15 refs. [Serb.serb.e.g.]

Pine [*Pinus sylvestris*?] stands in Yugoslavia occupy only a fraction of the natural area of the species; they are mostly old, excessively open, even-aged stands. The Pine plantations are much too young for resin tapping. The author recommends a new method of tapping to be applied for the next 30-60 years to the old Pine. The faces are to be small (only ca. 250 sq. cm. per year); the cuts very shallow, seldom penetrating beyond the bark and cambium layer. While the method used heretofore (3-4 days' freshening, 30 years tapping period) can only give a total yield of ca. 25.2 kg. of resin per tree, experimental tapping on small plots has shown that the new method, with the use of 25% HCl + $CaCl_2$, should give ca. 76.0 kg. over 60 years. The method is already in operation in some areas of Serbia. [Cf. *For. Abstr.* 14 (No. 2261).]

3035. GORDEEV, A. V. Vysokosmolonosnye porody—sosna krymskaja i sosna avstrijskaja. [High-resin-yielding species—*Pinus nigra* var. *caramanica* and *austriaca*.] *Lesn. Hoz.* 5 (7), 1952 (37-40). [Russ.]

These two varieties have proved suitable for afforesting the sands of the Ukraine, and show better resistance to insect attacks and disease, a higher resin yield and lower rate of transpiration than *P. sylvestris*. Properly worked 40- to 50-year natural stands of var. *caramanica* yield 700-1000 kg. resin/ha. against 150-200 kg. for heavily tapped *P. sylvestris*. The latter, however, is known to have given abnormally high yields in Rostov and Voronezh provinces, suggesting the existence of high-yielding strains. The resin yield of 40-year var. *austriaca* in Voronezh province is 2.5 kg. per narrow face per season; its resin contains 21-25% turpentine as against 21-32% for var. *caramanica*. Some data [based on 5 to 140 trees] for the resin yield of var. *caramanica* (in the Ukraine, Rostov and Crimea), var. *austriaca* (Voronezh) and *P. sylvestris* (Ukraine, Rostov and Voronezh) are tabulated for various

ages, quality classes, densities and methods of tapping.

3036. VYSOCKIJ, I. V. Opyt podsočki semenikov. [Tapping seed-trees.] *Derev. lesohim. Prom.* 3 (11), 1954 (13-4). [Russ.] P.R.

Presents the results of resin-tapping trials conducted since 1951-52 in Belorussia on seed trees [*Pinus sylvestris*?] after they have played their part in regeneration. The tapping method used was a two-storey one [cf. *For. Abstr.* 16 (No. 1790)], the pairs of faces being cut either one above the other or in échelon always with a considerable distance between them. Resin yield per tree varied in different years from 3280 to 4530 g., per face-pair from 1318 to 1660 g., and per freshening from 18.7 to 28.8 g. The échelon pattern not only gave a lower resin yield per freshening than the vertical, but higher face and stem mortality. It is concluded that tapping of seed trees some 2-3 years before felling is highly productive.

3037. GAVRILOV, B. I. Vlijanie podsočki na prirast. [Effect of resin tapping on increment.] *Lesn. Hoz.* 5 (7), 1952 (40-4). [Russ.]

The influence of resin tapping on the volume increment of 50- and 80-year *Pinus sylvestris* was studied on sample plots laid out in the Balakleev forest, Kharkov province (climate continental, annual rainfall 520 mm.). The Pines [number of trees not stated] were tapped by three methods: (1) heavy continuous tapping [multiple faces, 18 cm. wide?] in 1932-36 and 1938-40, with faces occupying 45-58% of stem girth; (2) moderate intermittent tapping, with faces (9 cm. wide) occupying 21-33% of the girth, in 1932-36, 1938-41 and 1946-48; (3) light—as (2), but faces occupying 10-16% of the girth. In 1937, 81 of the tapped trees and 62 controls were cut and the widths of the annual rings (36,036 measurements) and of the latewood (51,480) measured. Results, tabulated, show that the higher the % of girth occupied by faces, the heavier the drop in volume increment; the more suppressed and older the tree, the stronger its reaction to tapping. The drop in volume increment, caused by 5 years of tapping, expressed as a % of 5 years' increment of untapped controls was as follows (the two figures for each variant referring respectively to tree classes II and III): (a) Fresh sandy-loam soils: 80-year Pine—(1) 21-31.5, 25-30; (2) 5.5, 16.0. 50-year Pine—(1) 13.5, 11.0; (2) 6.0, 13.0. (b) Moderately dry sandy soils: 80-year Pine—(1) 16.5-21.5, 18.5-43.0; (2) 16.0, 8.5. Under (3) there was an increase in volume increment, of 1-17% over controls, for both soils and both ages of Pine. Investigations in 1947 indicated that tapping caused a shortage of carbohydrates due to a depletion of the starch and fat reserves of the phloem and wood in the production of fresh resin to replace that extracted, so stimulating an extra flow of assimilates from the needles; light continuous tapping increased this flow by 67% and heavy tapping by 127% in comparison with that of controls. Since photosynthesis is presumably stimulated in turn, the carbohydrate production under light tapping can be sufficient to maintain the growth rate. Tabulated data giving the volume c.a.i. (in cu.m. and %) for the various phases of the 17 years covered by the study

(for fresh sandy soils only) indicate that under tapping method (1) 80-year trees of class II show a 42% drop in volume increment after 5 years of tapping and regain their normal increment only after 4 years' rest, while trees of class III fail to regain their normal increment even after 8 years' rest. Though the absolute loss is small compared with the value of the resin obtained (ca. 3.7 cu.m. versus 1208 kg. resin/ha. from 200 trees), lowered vigour and resistance to pests need to be considered, and light tapping seems advisable.

3038. ZAJDLER, J. Zagadnienia związane z polepszeniem jakości żywicy sosny zwyczajnej. [Improving the quality of crude resin of *Pinus sylvestris*.] *Sylvan* 98 (4), 1954 (279-93). 1 ref. [Pol.]

Specific-gravity determinations (pycnometer method, volume ca. 0.6 c.c.) showed that the content of turpentine (*T*) in crude resin was: (1) when exuding from the tree, 40.7%, (2) at the lower end of a streak, 37.7%, and (3) at the lower end of the central gutter 36.1%, for a streak and gutter both 30 cm. long and a flow duration along the streak of 330 sec. and along the gutter 270 sec. Determinations on real faces were corroborated by results obtained with face models. To determine the effect of evaporation of the *T* constituents during tapping, the faces (*A*) and/or cups (*B*) were protected by wax-paper glued to the tree bark. With *A* and *B* both thus protected, the resin contained 39.1% *T*; with *A* alone protected, 35.7%; with *B* alone, 33.6%; and controls (open faces and receptacles) 30.0%. The shorter the gutter, the higher the *T* content in crude resin. The longer the freshening interval (data for 1, 2, 3 and 6 freshenings/week being tabulated) the greater the resin yield and *T* content per tree. A high correlation exists between resin yield and *T* content ($r = 0.870$ in the author's experiments). If only 1-2 g. of crude resin is delivered into the cup, the *T* content will drop from ca. 36% to 7-8% in 24 hours; if the amount is ca. 70 g., the loss in *T* content will only be ca. 1%. When the freshening interval is 2 days or more, collection should be more frequent, lest a large proportion of *T* evaporate. Experiments in July showed that resin collected at 4 p.m., from freshenings made at 7 a.m., contained 25.4% *T*, as against 29.9% for resin from freshenings made at 4 p.m. and collected at 7 a.m. next day. As far as storage or shipment in wooden barrels is concerned, it was found that the main *T* losses are due not to evaporation but to the selective filtering of the crude resin through the wood. Beech was found to be quite unsuitable for this purpose, Oak and Spruce much better. The staves should be quarter-sawn, and the barrel well constructed and as airtight as possible. Barrels are best stored in a concrete building; the crude resin should not remain in barrels longer than say, 3-4 weeks. Summarizing, the maximum *T* contents (i.e. the best quality) found in crude resin are: at place of flow, 40-41%; at the bottom of the face, 34-36%; when the cup is emptied, 30-33%, and, after barrel storage, 26-33%. Thus the *T* loss is ca. 15% for good operating and storage conditions, but can rise to 34% (i.e. *T* content down to 7%) when conditions are unfavourable.

3039. MORROW, R. R. Early tapping [of Sugar Maple] for more quality sirup. *J. For.* 53 (1), 1955 (24-5). 1 ref.

[*Cf. For. Abstr.* 16 (No. 1793).] Failure to collect the early run may mean loss of high-grade sap and reduction of total yield; combined with a cold March it may make the difference between an average and a poor season. The beginning of flow varies with weather, size of tree and crown, spacing, elevation and exposure. Large-crowned open-grown trees at low elevations often flow first. Equipment should be ready and sampling done early, using a hydrometer and watching the 5-day temperature forecasts. Where collection takes several days the south sides of the largest trees should be tapped first. If delayed, tapping the north sides first may be more profitable.

285. Leaf Crops

See Nos. 2648-9, 2870-2.

287. Bamboo and Cane Growing etc.

3040. ISTAS, J. R., RAEKELBOOM, E. L., and HEREMANS, R. Heeft bamboe voederwaarde voor het vee in Congo? [Has Bamboo any fodder value for cattle in the Congo?] *Bull. agric. Congo belge* 46 (1), 1955 (117-23). 10 refs. [Flem.f.]

Tabulates the mineral and organic constituents of the leaves (lamina + petioles + ultimate twig) of

Gigantochloa ater, *G. apus*, *G. verticillata*, *Bambusa vulgaris*, *B. metake* and *Cephalostachyum pergracile*. The analysis showed satisfactory nutritional value, and palatability trials also gave favourable results. Planted as firebreaks round paddocks they could supply dry-season green fodder, the SiO_2 content precluding use as hay. The best time to harvest requires further research particularly on the HCN content of buds and young shoots.

288. Crops Grown for Animal Products

See also No. 2629.

3041. SCHWÄRZEL, E. Bienenzucht und Forstwirtschaft. [Beekeeping and forestry.] *Wald* 2 (3) 1952 (85-6). [G.]

Mentions some bee-pasture plants, both woody and herbaceous, which can be grown either in the forest itself or on regeneration areas etc. in Germany.

3042. GALLEY, W. Bienenzucht und Forstwirtschaft (vom Standpunkt des Forstwirts aus gesehen). [Beekeeping and forestry (from the forester's point of view).] *Wald* 2 (6), 1952 (190-1). [G.]

Discusses Schwärzel's article and recommends Lime and Robinia in particular as useful from both points of view.

289.4. Shade Trees for Crops

See Nos. 2936, 3128.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. WORK SCIENCE (WORK STUDIES): GENERAL

3043. GLÄSER, H. Die Ernte des Holzes: eine Arbeitslehre für den Holzeinschlagbetrieb. [The harvesting of wood: work science for logging operations.] Wirtschafts- und Forstverlag Euting KG., Neuwied/Rhein. 1954. pp. 156. 140 refs. [G.]

A well illustrated practical manual, for German conditions, based on the author's lectures since 1945 at the Forestry Faculty of the University of Göttingen, Hann. Münden, and covering the felling and initial conversion of wood, along with dragging or skidding to roadside and stacking, from the point of view of correct working technique, choice and care of tools and equipment, and organization. The matter is arranged under the following major heads: (1) Principles of production: jobs and working conditions. (2) Labour: man and work, including composition of the labour force, and the physiology and psychology of work. (3) Tools, implements and machines. (4) Logging operations: preparation for and supervision of operations; working technique, accidents and safety measures; mechanization. (5) Costs: with reference to time and performance studies and the evaluation of work; determination of wages and piece-rates; control of performance (statistics of performance and earnings; comparisons of performance). There is a subject index, and a German translation of sections 30 to 36 of the Oxford Decimal Classification is appended.

3044. VÖRY, J. Eräiden metsätöiden aikautus- ja kuminaiseistojen analyysiä. [An analysis of the

material used in time studies of some forest jobs.] *Julk., Metsäteho, Helsinki* No. 31, 1954. pp. 117. 51 refs. [Fic.]

Discusses generally the amount of material needed for reliable results, methods, and differences between forestry and factory work as they affect time studies. Results of analyses of material available are given in graphs, showing variations in the shape of the distribution curve of time taken for cross-cutting or felling different assortments and diameters and for loading and unloading pulpwood bolts from a horse-sleigh by hand. A comparison is made with industrial time studies and it is concluded that, of the different means used, the arithmetic is most suitable for forest work. [With a 27-page English summary and English legends to graphs.] *From author's summary.*

304. Hygiene. Safety. Accidents and their Prevention

See also No. 3415.

3045. NAUMANN, B. Die Unfallgefährdung bei der Waldarbeit. [Accident risks in forest work.] *Wald* 2 (5), 1952 (149-51). [G.]

Discusses and tabulates the incidence of accidents (a) by operations, e.g. felling, skidding; (b) by parts of the body affected. The figures are based on thousands of accidents reported over a number of years in the Spruce regions of the Mittelgebirge and the Pine regions of the plains [of Saxony?].

305. *Sequence of Work and Performance (Time and Performance Tables, Evaluation of Work)*

See No. 3044.

307. *Tools, Equipment, Machines and Working Animals: General*

See Nos. 2833, 2884, 2914-8, 2967, 3176-8.

3046. PUTKISTO, K. Eräitä metsätöiden koneellistumisnopeuteen vaikuttavista tekijöistä. [Some factors affecting the rate of mechanization of forestry jobs.] *Tied., Metsäteho, Helsinki* No. 107, 1954. pp. 5. [Fi.e.] (Repr. from Suomen Puutalous, Helsinki 1954 (9), (305...310).)

The main factors discussed are availability of labour, wage levels, availability of capital, size of enterprise and training.

31. LOGGING AND TRANSPORT: GENERAL

See also Nos. 2580, 3043, 3557, 3615.

3047. AHMED, M. D. Timber resources and exploitation in Kassalong reserve, Chittagong Hill Tracts division. *Pakistan J. For.* 4 (3), 1954 (189-95).

Gives some particulars of tractors used, their consumption of oil and petrol, and performance; also describes rafting methods.

3048. MAINARDI, G. La rottura della foresta nella preamazzonia peruviana e problemi che comporta. [The exploitation of the forests in the preamazonian region of Peru.] *Riv. Agric. sub trop., trop., Firenze* 48 (10/12), 1954 (405-11). [It.it.e.] E.M.B.

Discusses the difficulties of felling and transporting timber in the forests on the eastern slopes of the Andes, with particular reference to the problem of maintaining mechanized equipment in tropical rain forest.

32. FELLING AND RELATED OPERATIONS

See also No. 3043.

3049. SOUSA, O. DE ALMEIDA E. (Conservação das madeiras—I.) Época de corte e secagem natural das madeiras nacionais. [Wood preservation. I: Felling season and air seasoning of native timbers.] *Estud. Inform. Serv. flor. aquic. Portugal* No. 41-D6, 1954. pp. 42 + 2 plates. 23 refs. [Port.port.] Limited distribution.

Summarizes methods to be used in felling, log storage and air-seasoning of timber, in order to avoid deterioration.

322. *Felling Season. Preparatory Measures*

See also No. 3348.

3050. YLI-VAKKURI, P. Neuvontajärjestöjen ammattimiesten suoritettavista leimauksista varsinaisissa yksityismetsissä. [Marking in private forests [in Finland].] *Acta for. fenn.* 61 (6), 1954. pp. 14. 5 refs. [Fi.g.]

A time study.

3051. BENIĆ, R. Ljetna i zimska sječa jelovine u Gorskom Kotaru. [Summer and winter felling of Silver Fir in the Gorski Kotar [Yugoslavia].] *Drvna Industrija, Zagreb* 5 (1/2), 1954 (1-7). 3 refs. [Croat. croat.] P.R.

According to available data, the output (in cu.m. of round timber obtained) of felling and preliminary conversion in the Gorski Kotar selection Fir forest in the period May-July is some 154% of that in Nov.-Jan. The lower figure for the winter period is due both to weather and to the difficulty of barking.

3052. ZIEGER, E. Untersuchungen über die Anwendbarkeit der chemischen Entrindung. [Research on chemical barking.] *Arch. Forstw.* 3 (1/2), 1954 (37-81). 6 refs. [G.]

Summarizes Canadian, Scandinavian and German experience and describes, with detailed tables, the results of trials with 3-year-old potted Norway Spruce and mature trees in the field. About 80% of wood production has to be barked, and chemical barking is estimated to save, for 1,500,000 cu.m. of wood, DM.1,531,245 in costs, 67,344 man-days, and 251,875 tons in transport. In the pot experiments, plants were girdled basally and liquid doses of 2 c.c. of one of 9 chemicals were applied with a syringe or in paste. Girdling at half height with or without poison was also done. The rapidity of onset of death is generally a reliable indicator of the effectiveness of the chemical for bark loosening (finger-nail test) and young plants are useful in these tests. Na arsenite was the best, with paste superior to solutions. The next best were NH_4 rhodanide and NH_4 sulphamate, with phenol showing only a limited effect. In the field, the effects on Spruce of (a) season of application, (b) various arsenite formulations, (c) safe substitutes for As, were investigated. The effects are detailed in tables showing the phenology of the poisoned tree and the resistance to barking (measured by a barking resistance meter) in the lower, middle and upper part of the bole, when felled the following autumn. For (a) the best period is end of May to mid-July with a period of less effectiveness in early July. Early autumn frosts diminish the chemical effect but this is restored next spring. In (b), formulae with NaOH or Na_2CO_3 showed no advantage. Na arsenite strength should be 20%. Width of girdle made no difference. Applications in (c) were made too late and too weak for any significant results.

3053. BERNTSEN, C. M. Some results of chemical debarking on Sitka Spruce, Western Hemlock and Red Alder. *Res. Note Pacif. Northwest. For. Range Exp. Sta.* No. 104, 1954. pp. 7. 1 ref.

Out of 4 chemicals brushed on to b.h. band girdles in July-Aug., only undiluted Na arsenite gave 100% kill for Sitka and Hemlock (100 years old) within 2 months, bark being readily removable (except below the girdle) within 1 year. Alder bark, however, often remained tight. A basal spray of Alder with 2,4-D and 2,4,5-T (2%) in diesel oil killed several 30-year-old trees in 2 years and the others appeared to be dying.

3054. RAPHAEL, H. J., PANSHIN, A. J., and DAY, M. W. 'Chemical' bark peeling of Aspen, 1952 and 1953 field tests. *Quart. Bull. Mich. agric. Exp. Sta.* 37 (2), 1954 (230-40).

Field experiments on the effectiveness of (1) Na monochloroacetate, (2) NH_4 sulphamate (ammate), and (3) a 50 : 50 mixture of 2,4-D and 2,4,5-T esters, in loosening bark of Aspen (*Populus tremuloides*) [cf.

For. Abstr. 15 (No. 320)] were continued. Neither (1) nor (2) was sufficiently consistent in killing Aspen except when used in quite uneconomic amounts and concentrations. A satisfactory kill was obtained with 4 lb./gal. and 7 lb./gal. solutions of (2) at a rate of 1 quart/5-10 trees. Satisfactory peeling is obtained with all these chemicals if the trees are killed, but when the cambium is only partially killed, peeling is effective only on the killed portions of the stem. The bark tends to tighten again in the late fall on trees killed with (2), and to some extent on those killed with (1). The bark on trees killed with (3) comes off in large pieces, that on trees killed with (1) is crumbly and not in good condition for peeling in the woods. Excessive discoloration was encountered in trees treated with (1). Compared with earlier experiments, results in general were much less satisfactory, both in % of trees killed and in condition of bark; an excessively dry August may have been partially responsible. Three years of field trials have revealed a lack of uniformity in the lethal effects of the chemicals used and too much variation in the bark-peeling characteristics of treated Aspen; hence the use of these chemicals on a commercial scale cannot be recommended.

323. *Felling and Subsequent Primary Conversion*

See Nos. 3062-8, 3080.

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE. HARVESTING OF SMALL WOOD

See also Nos. 2595, 2623, 2814, 3115.

3055. NIXON, G. R. W. A logging study in a typical overmature Spruce/Balsam forest of the Southern interior of British Columbia. *B.C. Lumberm.* 39 (1), 1955 (44 . . . 50, 54). 2 refs.

There appeared to be no significant difference in defect, waste or breakage entailed in clear felling, single-tree selection or salvage group selection, these losses being identifiable during felling and cross-cutting and accounting for 95% of the total. The balance is due to the loss of logs left in the slash.

3056. CLARK, D. H. Inexpensive timber salvage equipment proves practical. *Circ. Inst. For. Prod., Wash.* No. 28, 1954. pp. 6.

The equipment (illustrated) consists of a heavy lorry, a very heavy spar-tree hinge, and a chain saw for suspension from the spar tree. The hinge is bolted at the base of the spar tree of about 24 in. diam. and the tree then felled, with the sawcut at the hinge. It is cut to a 20-ft. length, trimmed, and rigged with a horizontal I-beam boom which swings through an arc of 180°. The spar tree is then partly raised and a hydraulic-cylinder assembly, with an 8-ft. vertical movement, is attached to the boom by a 4-wheel trolley that runs on the lower flange of the I-beam. The spar is then pulled up to the vertical and guyed. A chain saw with 9-ft. blade, motor and built-out operator's platform is attached to the hydraulic cylinder base. A double drum on the

lorry is used to yard 8-ft. salvage logs and load them on the lorry bed, which is used as a sawing platform. A hinged steel cradle at the back of the lorry serves as a log ramp and also hinges back over the load to prevent shifting on rough roads. After the lorry is loaded it is backed under the suspended saw, and the logs are sawn into clear 8-ft. cants ranging in sizes from 8 × 8 to 24 × 30 in. These cants are sold to plywood mills. Only a 2-man crew is required.

3057. The mechanical clearing of forest and scrub land. *World Crops* 6 (8), 1954 (333-6). O.R.E.

A short review of some modern methods and equipment.

3058. SIJPKENS, J. P. Mechanische ontginningen in Australië. [Mechanical [land] reclamation in Australia.] *Landbouwk. Tijdschr., Wageningen* 66 (12), 1954 (817-35). [Du.] A.P.B.

Describes the different methods and equipment used in clearing the trees and in breaking up, fertilizing and sowing the ground for agricultural crops in savanna woodland, Mallee scrub and heath, in the '90-mile desert' and in tropical rain-forest.

3059. GRINDROD, J. Hi-Ball land clearing in Western Australia. *World Crops* 6 (10), 1954 (420-1). O.R.E.

The American Hi-Ball method of land clearance has been successfully adopted by the Land Settlement Board in W. Australia [cf. *For. Abstr.* 14 (No. 1118)]. About 50,000 acres have already been cleared at costs ranging from 20s. to 6s./acre.

3060. RYAN, F. E. Park land clearing. *Bull. Dep. Agric. W. Aust.* No. 2202, 1954. pp. 4. (Repr. from *Journal of Agriculture of Western Australia, Perth* (Ser. 3), 3 (6), 1954 (651-3).)

The usual method of clearing forest land to make grazing paddocks, includes girdling the larger trees, whose disposal later entails danger and expense. A trial demonstration is described, in which the lighter tree growth was removed by bulldozer, windrowed and burnt, the area cultivated and sown with grass and clover, and the larger trees left standing, with excellent results. It was expected that when areas such as this were cleared, the consequent rise in the water table would cause the death of the standing trees, but though the area became waterlogged during the winter and some trees died, the same thing happened on the surrounding untreated area. Over a period of 3 years, the cost of developing a strong pasture on 16 acres of land was ca. £16/acre.

3061. Défrichement de la forêt marécageuse du Surinam au moyen de produits chimiques. [Clearing of swamp forest in Surinam by poisoning.] *Agron. trop.* 9 (6), 1954 (720-4). [F.]

Describes several experiments, some on a large scale, in clearing land for agriculture by poisoning the larger trees, particularly along river banks etc. Na arsenite proved the most effective poison; clearing the undergrowth in order to approach the trees accounted for nearly half the cost of operations. Soft-wooded species such as *Erythrina glauca* and *Triplaris surinamensis* died quickly; hard species such as *Tabebuia longipes* were more resistant.

35. PERFORMANCE MEASUREMENTS FOR DETERMINING PIECE RATES IN FELLING AND RELATED OPERATIONS

See No. 3043.

36. TOOLS, MACHINES AND EQUIPMENT FOR FELLING AND RELATED OPERATIONS

See also Nos. 3043, 3420.

3062. SALMINEN, J. Väliavarastokuorinnasta siirrettävällä jatkuvasyöttöisellä kuorimatoneella. [Barking at an intermediate storage site, using a portable continuous-feed barking machine.] *Tied., Metsäteho, Helsinki* No. 110, 1955. pp. 9. [Fi.e.] (Repr. from *Suomen Puutalous, Helsinki* 1955 (1; 2).

Studies were made on the Finnish Valo portable barking machine [illustrated] which works on the continuous-feed principle and crushes the cambium layer. Two-metre coniferous pulpwood was barked. When the machine is moved and loaded by hand, a crew of 4-6 is most suitable. Average working-site time for an average diam. o.b. of 12.8 cm. is 5.12 min./stacked cu.m. The relation of production rate (cu.m. stacked measure) to log size and barking speed (in m./min.) is shown graphically, and related to production by hand barking. Allowing for mechanical stoppages as 20% of working-site time, production rate for logs of a size to give 23 two-metre bolts per unbarked, stacked cu.m. is 10 unbarked, piled cu.m., per working-site hour. Average consumption per unbarked, stacked cu.m. is 0.25 litre petrol, 0.01 litre motor oil and 5.4 g. lubricating grease. The general quality of the barking is illustrated in photographs. Spring pressures used have no adverse effect on barking till temperatures drop below -10° C. Results were best for logs 10-18 cm. diam. u.b., becoming steadily less good for diameters on either side. The amount of bark remaining on the logs averages 0.7% by volume as against 4% for hand barking. Barking loss in terms of stacked measure is about the same as for hand barking. Output per man is 1.7-3.4 times that for partial barking by hand, depending on the size of the crew and of logs. Saving in cost compared with partial barking by hand is 50-67% in wages and 19-36% in total costs. A tractor-operated machine is recommended for small scattered working sites. Cross-cutting with a circular saw connected with the machine gave a considerable saving. A tractor-borne crane can be used to move long logs to it.

3063. 'Jätkä 1' kniwbarker. [The 'Jätkä 1' knife barking machine.] *Inform. Skogbr. Skogind. Forskn.-Foren. (Transportutv.)* No. 36, 1954. pp. 3. [Nor.]

Describes with illustrations the 'Jätkä 1', a Finnish machine, which weighs only 217 kg. and, being mounted on sledge runners, is readily mobile. There are 3 knives rotating at 400-500 revs./min., against which the bolts (the machine is designed for 1-m. pulpwood) are held by the operator; when half the length has been barked the bolt is reversed. The time taken is 25-30 sec./bolt, increasing with bolt diameter, and the quality of barking is good. There is an average wood-fibre loss of 10%, rising with decreasing diameter and crooked wood.

3064. S., G. En ny barkningsmaskin. [A new barking machine.] *Skogen* 42 (5), 1955 (99). [Sw.]

A new mobile barking machine, BAS, from AB Vikarbyverken, weighs 750 kg. and can be driven from a 9-h.p. petrol engine or direct from a tractor. The log rotates and is pressed by hydraulic pressure against 4 steel wires fixed in a sprung frame which moves to and fro during barking. The prototype, designed for pulpwood, 1.5-11 in. in diam. and in 3-m. standard lengths, barks softwood and Birch. Machines for other lengths and diameters up to 15 in. will be available. A crew of 2-3 is needed.

3065. SCHLEGEL. Arbeitsorganisation beim Einsatz von Motorsägen. [Organization of work with motor saws.] *Wald* 2 (4), 1952 (109-11). [G.]

Gives detailed suggestions for the organization of gangs and working procedure in felling and cross-cutting.

3066. L., S. Å. Lättare motorsägar. [Lighter power saws.] *Skogsägaren* 31 (2), 1955 (42-3). [Sw.]

Describes very briefly, with a photograph of each, the McCulloch (American), Raket (Swedish) and Stihl and Dollmar (German) saws, all weighing under 15 kg. and considered very suitable for Swedish forestry.

3067. MCKENZIE, W. M. The power chain saw and the farmer. Repr. from *Mobil Country Journal* 21 (2), 1954. pp. 3. (Repr. Div. For. Prod. Aust.) P.R.

Describes their various uses in farm work.

3068. SALMINEN, J. Siirrettävistä hakkureista. [Portable chippers.] *Metsät. Aikak.* 1955 (1), (20-4). [Fi.fi.e.] (*Tied., Metsäteho, Helsinki* No. 111.)

Discusses [and gives photographs with English legends of] the American 'Impco' the German 'Wigger' and the Austrian 'Rapid' and 'Pöttinger' chippers. In Finland weight limits the use of portable chippers to logs with a max. diam. of 6 in. If long logs are to be chipped it is better to transport them whole and chip them at the plant. From author's summary.

3069. The Whitmore ladder saddle. *Quart. J. For.* 49 (1), 1955 (51 + 4 photos).

Short illustrated account of a device (tubular frame, hooks and chain) invented by G. C. Wolryche-Whitmore, to be fixed to a ladder when pruning etc. It is used as a prop, not as a seat, and if the correct position is adopted, a feeling of complete safety is given, and the upper part of the body, including both hands, has perfect freedom of movement.

3070. DERİF, I. G. Prispособlenie dlja lazaniya po derevjjam. [Climbing irons.] *Lesn. Hoz.* 5 (6), 1952 (90-2). [Russ.]

Describes and illustrates climbing irons of the author's design, tried with success for seed collection in the 'Aleksandriya' reserve of the Ukrainian Academy of Sciences.

37. TRANSPORT

3071. PUTKISTO, K. Pienpuutavaran siirtelyn koneellistaminen. [Mechanization in moving small timber.] *Metsät. Aikak.* 1955 (1; 2), (31-5; 55-62). [Fi.e.]

Deals mainly with the more important technical properties of new light-weight conveyors [illustrated] for moving small timber (pulp and fuelwood cut to standard sizes, and pitprops) over short distances, and the results of time studies. The equipment studied has to be fed and unloaded by hand. Its use means that variation with the height and length of the move are eliminated. A 2-man team, using conveyors carrying the bolts longitudinally, moved 14–15 stacked cu.m. per hour of 2-m. partly barked, seasoned pulpwood or 10–12 cu.m. of 1-m. wood, on to a railway wagon regardless of moving height or distance. This is a saving in labour of 40–50%. It is not worth using the equipment for loading lorries if they can drive close to the stack. Two men, using a conveyor carrying the bolts transversely, loaded 9.85 cu.m. fuelwood per hour on to a lorry. The equipment can also be used for rolling timber into water, lifting it out, loading and unloading craft of all sizes, and moving timber for barking and cross-cutting. The financial saving is estimated at Marks 15–20/stacked cu.m. for normal conditions in e.g. loading railway wagons. It is concluded that the conveyors are technically good and serviceable. [Legends to photographs, graphs and diagrams are in English.] *From author's summary.*

372/377. Land Transport

See also Nos. 3047, 3056, 3308, 3546.

3072. STEINLIN, H., and ZEHNTNER, K. Untersuchungen zur Verbesserung des Holztransportes im Gebirge. II Mitteilung. [Research on the improvement of timber transport in mountains. Part II.] *Mitt. schweiz. Anst. forstl. Versuchsw.* 31 (1), 1954 (102–52 + 6 photos). 34 refs. [G.g.f.]

Deals with skidding downhill, using winch and cable. The advantages and method of using various kinds of winch (motor, tractor-mounted, twin-cable etc.) on different types of terrain are explained in detail. [Cf. *For. Abstr.* 15 (No. 2572).]

3073. GECOW, R. Z pracy kolejki linowej 'Transporta' w Karkonoszach. [Experience from the operation of the 'Transporta' cableway in the Karkonosze [Riesengebirge].] *Sylvan* 98 (5), 1954 (389–403). 8 refs. [Pol.]

During a 4-months' operation period, the 'Transporta' cableway (a Czech modification of the Lasso-Cable system, from which it differs mainly in having a single closed-circuit 4-km. cable) showed a mean daily output of 50.5 cu.m., a speed of 0.67 m./sec. at full load of 3400 kg., with loads (pulpwood, fuel etc.) averaging 25 kg., at ca. 7-m. intervals. The cableway was used in a place where no mechanical skidding was practicable, and where manual skidding would be 13 times as costly. The average haul was 1.5 km.

3074. TOMANA, K. [Maximum tension of the hauling ropes [operating line] on to-and-fro aerial ropeways. (2); (3).] *J. Jap. For. Soc.* 36 (6; 7), 1954 (167–72; 188–90). [Jap.e.]

(2) An equation has been calculated for the maximum tension of the line when the tension of the skyline is kept constant with counterweights.

(3) Develops an equation for maximum tension of the line for a constant length of skyline.

3075. ALLOUARD, P. L'entretien des câbles: quelques cas concrets d'application en exploitation forestière tropicale. [The maintenance of cables: some examples of its application in tropical logging operations.] *Bois For. Trop.* No. 38, 1954 (59–66). [F.]

Describes some actual examples of the implementation of the rules laid down in a previous article [cf. *For. Abstr.* 16 (No. 1835)], some practical methods of lubrication, and the economic advantages of chokers, splices and flanges.

3076. TUFFIER, M. L'actualité en matière de camions. [Recent developments in lorries and tractors.] *Bois For. Trop.* No. 39, 1955 (49–64). [F.]

Describes (with illustrations and specifications) a number of tractors and lorries of European manufacture exhibited at the 1954 Salon de l'Automobile, with particular reference to those suitable for use in tropical conditions.

3077. HAKKARAINEN, A. E. Puutavara-autolle asetettavista vaatimuksista suoritettun tiedestelun tuloksia. [The results of an enquiry into requirements for timber trucks.] *Tied., Metsäteho, Helsinki* No. 104, 1954. pp. 5. [Fie.] (Repr. from *Suomen Puutalous, Helsinki* 1954 (10), (351–5)).

Summarizes results of an enquiry into preferences as regards petrol or diesel fuel, number of gears, number of axles, and size of lorry.

378. Water Transport

See also No. 3047.

3078. STOLPE, N. Uittoja, sen organisatiota ja tulevaisuutta koskevia näkemyksiä. [The organization and future of timber floating [in Finland].] *Acta for. fenn.* 61 (5), 1954. pp. 12. [Fie.]

3079. ROITTO, W. E. Eräitä näkökohtia Saimaan vesistöalueen puutavaran kaukokuljetuksen kehittämismahdollisuuksista. [The possibilities of developing long-distance transport of timber on the water system of Saimaa Lake.] *Acta for. fenn.* 61 (3), 1954. pp. 19. [Fie.]

3080. TUOVINEN, A. Eri tavalla käsiteltynä havutukkien uppoamisesta. [Sinking of softwood logs treated in different ways.] *Metsät. Aikak.* 1954 (12), (502–4); 1955 (1), (25–30). 3 refs. [Fie.]

An investigation was made on the Kokemäenjoki floating system in W. Finland with 16,000 numbered logs of Norway Spruce and Scots Pine. Half were winter barked in the forest, and half extracted unbarked (U); two groups were barked at the storage site. They were all stacked mixed, on skids, were launched at different times in April and May, and left floating for 1–4 months, either loose the whole time or bundled for a time and then loose. Buoyancy measurements were made at intervals during the floating period. Results are given in graphs and tables [with English legends]. (1) Pine:—An average of 1.4% of logs barked in the forest (B) and 5.8% of U sank. For U, heartwood (h.w.) % was the most important factor, and for B, the quality of seasoning. More butt logs sank than middle and top logs. Length of seasoning was

important for logs barked at the storage site; those seasoned for 3-4 weeks produced 0.4% sinkers, those seasoned for only 1½-2 weeks 4.8%; the h.w. % was also important. In bundle-floating, logs in the upper part of the bundle retained their buoyancy for a considerable time during subsequent loose floating, *U* longer than *B*. The average volume of the sinkers was ca. 77% of that for all logs, and sinkers had a volume below average for the class in every heartwood class. (2) Spruce:—Sinking was slight during 2 months of loose floating and for *U* was lower than that of Pine at the end of the floating period. Butt logs, especially *B*, gave better results than top logs. Improvement in storage conditions decreased the number of *B* sinkers. For Spruce logs barked at the storage site 3-4 weeks before floating, sinking was 0.6%, and for those barked only 1½-2 weeks earlier 2.8%. Bundle floating gave similar results to those for Pine. The average volume of *B* Spruce sinkers was 54%, and of *U* 62%, of the average for all logs in each barking group. Similar differences were found within the different h.w. classes. Conclusions are that it is generally not worth barking logs for short floating periods; suitable storage gives satisfactory results. In prolonged floating, Spruce logs in which h.w. accounts for < 40% of the top diameter should be barked, and Pine logs with 40-50% h.w. Logs with little h.w. should be stored carefully and logs with < 50% h.w. should not be used as foundation logs. [Cf. *For. Abstr.* 14 (No. 1843).] *From author's summary.*

3081. All weather log towing now possible on coast. *B.C. Lumberm.* 39 (1), 1955 (53-4).

Describes a sea-going barge taking up to 6000 tons of logs loaded athwart a flat deck. Logs are slid off by filling tanks on the port side (12 min.), the barge automatically righting itself within seconds. Cost for a pair is a little more than \$1,000,000. Towing time, cost, insurance, and weather delays are reduced. The barge negotiates weather that would break up a flat raft, distress a bundle boom, and render a Davis raft unmanageable.

38. FOREST ENGINEERING

383. Roads and Bridges

3082. BERGER, J. Der Bau stabilisierter Waldstrassen. [The construction of stabilized forest roads.] *Forstwiss. Cbl.* 73 (11/12), 1954 (329-49). 10 refs. [G.g.]

Stabilized roads are defined as those able to carry traffic in any weather without losing their form. Road-construction methods used by the Austrian Forest Service since 1950 are described.

384. Protective Works

3083. ROLLEY, J. Nouveaux types d'ouvrages de retenue en Suisse contre les avalanches. [New types of engineering works against avalanches in Switzerland.] *Rev. for. franç.* 7 (1), 1955 (1-8 + 8 photos). [F.]

4. FOREST INJURIES AND PROTECTION

3084. DAY, W. R. Forest hygiene in Great Britain. *For. Bull. Univ. Toronto* No. 4, 1955, pp. 26 + 9 photos.

The substance of two lectures given at the University of Toronto.

3085. MAKSIMOVIĆ, M. Neki podaci o štetama u šumama NR Srbije u 1953 godini. [Forest damage in Serbia in 1953.] *Šumarstvo* 7 (11/12), 1954 (681-6). [Croat.]

Lists (in ha., cu.m., or number of seedlings, and Dinars) the damage done by various climatic agencies or animals (insects, deer, man), in forests, plantations and nurseries.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. Natural and Biological Control

See Nos. 2635, 2638-9, 2642, 3182, 3188, 3198-9, 3217, 3220-1, 3231-2.

414. Chemical Control

See also Nos. 3122, 3172-5, 3191-3, 3223.

3086. TILÉMANS, E. M., and DORMAL, S. La toxicité des produits antiparasitaires. [Toxicity of phytosanitary chemicals.] *Bull. agric. Congo belge* 45 (6), 1954 (1763-92). 33 refs. [F.e.g.] (*Repr. from*

Revue de l'Agriculture, Service économique du Ministère de l'Agriculture de Belgique No. 8, 1954.)

The available information from 33, mainly recent, papers is summarized for 25 poisonous and 30 dangerous substances or classes of substance on sale in Belgium. Mean lethal doses in mg./kg. live weight (ingested) and limits of tolerance in mg./litre air (inhaled), as also for skin contact, subcutaneous and intra-muscular injection and cumulative effects are quoted where available for man, rodents, poultry and insects. The precautions in use and storage, legal restrictions, symptoms, antidotes and first aid are treated generally and for each poison. Formulae include proprietary substances.

416. Types of Injury

3087. JACQUIOT, C. Action sur des tissus végétaux de facteurs naturels produits par des organismes parasites d'arbres. [Action on vegetable tissues of natural substances produced by organisms parasitic on trees [with discussion].] *Année biol. (n.s.)* 30 (7/10), 1954 (457-60 + 8 photos). 13 refs. [F.] O.R.S.

Discusses the preliminary results obtained from research still in progress. Extracts from galls of *Agrilus biguttatus* on Oak and from mycelium of *Phellinus robustus* are being tested on Chestnut and Jerusalem artichoke. [Cf. *For. Abstr.* 15 (No. 3816).]

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. Air Currents

See also Nos. 2812, 3136.

3088. ALEXANDER, R. R., and BUELL, J. H. Determining the direction of destructive winds in a Rocky Mountain timber stand. *J. For.* 53 (1), 1955 (19-23), 10 refs.

The direction of throw from butt to top of windfalls in $\frac{1}{4}$ -acre plots in a 10% sample was recorded in 20° sectors of the compass, separately for Spruce and Lodgepole Pine on west and east slopes, on the ridge and in Spruce bog and stream-bed. Wind-rose diagrams show the results in total windfalls/acre for each of the 18 sectors. Similar diagrams show separately the falls per acre of living trees (extensive root systems and large mounds) and of dead, butt-rotted and broken trees. The results show a relatively uniform westerly windflow pattern uninfluenced by topography. Aspect and type, and whether trees were alive or dead, had little influence on direction of throw. To simplify such studies a tally should be made of live windfalls only, as many old ones as possible being included to extend the period of damage. Initial sampling should be light and widespread. The information is required to determine the direction of strips in alternate clear-strip felling, which promises to reduce windthrow, one of the major causes of local mortality.

3089. WUTTKY, K. Die Gefährdung der Fichtenwirtschaft des Harzes durch Sturm. [The storm risk in the management of Norway Spruce in the Harz.] *Arch. Forstw.* 3 (3/4), 1954 (261-73 + 1 tbl.). [G.]

Displays in histograms, wind-roses, and tables the distribution of storm days (Beaufort scale 8-12) over 20 years on the Brocken (Harz; 1142 m.) and the Fichtelberg (Erzgebirge; 1204 m.). Tables show the wind direction and strength at the 3 daily observation times and outside these in 2- to 3-monthly periods for each station. These periods are distinguished as having (a) frost-bound soils and conditions unfavourable to wind-throw but favourable to breakage (by ice, rime and snow), Dec.-Feb.; or (b) favourable to wind-throw, March-May and Sept.-Nov. (wet soils). The danger, especially in older stands, of too rapid conversion from even-aged pure Spruce to the mixed uneven-aged groups required by the present ideal of management for the benefit of the growing stock, is pointed out. The heavy fellings advocated by Krutzsch for this conversion, if applied in the Harz, would endanger whole stands even on eastern aspects.

422. Temperature Influences. Frost. Heat. Drought

See also Nos. 2665-7, 2738, 2946-7, 3239-40.

3090. GLOBE-MIHAILENKO, D. A. Osobennosti povrezhdeniya subtropicheskikh rastenii morozami. [Peculiarities of frost damage to subtropical plants.] *Lesn. Hoz.* 5 (6), 1952 (72-5). [Russ.]

During the 1949-50 winter, when frosts occurred before the trees had entered dormancy, *Feijoa sellowiana* and *Eucalypts* believed to be frost-hardy

were only slightly damaged; but in the 17-day cold spell that followed, when near-ground temperatures dropped to -12°C . and did not rise above 0° for 12 days, many of the trees were badly injured or killed. Since the injuries were caused by freezing of the sap (chiefly in the lower part of the stems, 20-25 cm. from the ground), increased resistance might be brought about by reducing the trees' water content during the cold season. This has been confirmed by an experiment in which 100 one-year-old *Eucalyptus viminalis* seedlings, transplanted in Dec. 1950 from nursery into the grounds of the Sochi experimental forest, remained almost undamaged, whereas 90% of the plants left undisturbed in the nursery were killed back to ground level by frost, a difference attributed to the physiological check and therefore lowered water content of the transplants. It is noted that in a *Quercus suber* plantation at Kudeptinsk, all trees from which bark was stripped in autumn 1949 were killed that winter (absolute minimum -19°C . and snow persistent for 35 days), while those with intact bark remained undamaged. The bark should therefore be removed only in spring, a thin one-year-old bark being sufficient to protect the tree provided the first 50-60 cm. of the stem are not stripped and that stems on the coldest sites are covered during the following winter with straw mats. As protection for young *Feijoa sellowiana*, earthing up the stems to a height of 20-25 cm. is suggested. Subtropical species may also be grafted on rootstocks of species more resistant to frost.

3091. LAVRINENKO, D. D. Vlijanie zasuhi na listvennicu v svezhih dubravah lesostepi USSR. [Effect of drought on [Siberian] Larch in the moist Oak woods of the forest-steppe zone in the Ukrainian S.S.R.] *Lesn. Hoz.* 5 (6), 1952 (47-50). [Russ.]

An investigation into the dieback of Siberian Larch between 1925 and 1951 in the 1916 Oak, Ash, and Larch plantations of the Krasny-Trostjanets Forest Experiment Station indicated that it was twice as severe in 1940-46, after the two exceptionally dry summers (1938 and 1939) followed by the very cold winter of 1939-40 (temperatures dropping to -17°C .), as during the preceding (1925-39) and subsequent (1946-51) periods. As drought years considerably reduced the growth rate of the Larch, but only slightly affected that of the Oak and Ash, and as Larch dieback was most severe where the proportion of Ash was highest, and where the roots of the latter, being most numerous in the upper 0-10 cm., intercepted most of the moisture, it is concluded that drought was the primary and frost the secondary cause of the dieback.

423. Precipitations

3092. SHIDEI, T. [Studies on the damage to forest trees by snow pressure.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 73, 1954. pp. ii + 89 + 44 photos. 106 refs. [Jap.e.]

Most of the forests of Japan lie under snow in the winter and in the central mountain ranges and along the Sea of Japan, this is generally > 2 m. deep until the spring thaw. Trees partially or completely buried, with their crowns loaded with snow, are

damaged in large numbers. This study, which excludes avalanches, covers the influence of the physical characters of different types of snow and the influence of the geographical and topographical distribution and of the climate on snow pressure, which is classified. The weight of the snow crown is discussed in relation to wind, temperature and crown shape. The settling force of snow burying an object is related to the height and perimeter of the object and the average shearing stress (generally 150 g./sq. cm.) of the snow. Creeping pressure (down slope) and the factors influencing it are also discussed. Under breaking, splitting, falling, and uprooting, 12 sorts of damage are listed. The critical height for trees is twice the average depth of snow. Below this they are subject to settling force and creeping pressure under complete burial; above this the damage is from bending and breaking under snow crown weight. Preventive measures recommended include differing silvicultural treatments required in these circumstances in planting and tending as well as in location and the choice of resistant species. These are given as *Cryptomeria japonica*, *Larix leptolepis*, *Abies firma*, *Picea hondoensis*, *Chamaecyparis obtusa*, *Thuja dolabrata* and Pines. Snow-study techniques include a centrifugal device for determining free water in snow and a glass-tube method for sampling a snow profile for 'strength' [? consistency]. [There is an English summary of 6½ pp. and many photographs and diagrams.] *From author's summary.*

424. Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.

See also No. 2626.

3093. RICHARDSON, S. D. Effects of sea-water flooding on tree growth in the Netherlands. *Quart. J. For.* 49 (1), 1955 (22-8).

An account of the damage caused by the storm of Jan. 1953 [cf. *For. Abstr.* 15 (No. 3682)] and a comparison with that recorded in England [cf. *For. Abstr.* 16 (No. 594)]. The research now being undertaken in Holland in connexion with flood damage to trees is also briefly described.

3094. MASSON, J. Observaciones sobre la construcción de la gran represa del Ourthe, desde el punto de vista de la protección de los bosques, la caza y la pesca. [The Ourthe dam from the point of view of the protection of forests, wildlife and fish.] [Proceedings] Technical Meeting, International Union for the Protection of Nature, Caracas 1952, 1954 (287-8). [Span.]

The loss of timber by flooding this area is estimated at ca. 3000 cu.m. per year.

3095. [Response of chlorotic *Pinus caribaea* to fertilizer.] *Rep. For. Dep. Trin. Tob.* 1953, 1954 (16).

Healthy plants of *P. caribaea* went into check and turned yellow when planted out in P-deficient savanna soils. Surface dressings of phosphates took rapid effect. The needles of this Pine have a high P content, and it is probable that once enough needles die and fall the problem of P deficiency will be over.

3096. STONE, E. L., JR. Magnesium deficiency in

some northeastern Pines. *Proc. Soil Sci. Soc. Amer.* 17 (3), 1953 (297-300). 14 refs. O.R.E.

Mg deficiency was studied in *Pinus resinosa*, *P. strobus* and *P. banksiana* plantations on light-textured podzol soils in New York State. The most characteristic symptom is the yellowing of the tips of the current year's needles. In severe cases the chlorosis was followed by death of the needle tips or premature loss of foliage, but severe reductions in shoot growth occurred only in extreme cases or when accompanied by K deficiency. In *P. resinosa*, deficiency symptoms were usually associated with Mg contents < 0.16% of oven-dry weight of mature first-year foliage; at contents < 0.13% symptoms were severe. Applications of $MgSO_4$ at 20-50 lb. Mg/acre eliminated or reduced symptoms after a lapse of at least a year and increased height growth for at least 3 years. In two instances growth increases were associated with K and Mg applications individually, without evidence of interaction. *From author's summary.*

425. Chemical Influences (Atmospheric)

3097. PEACE, T. R. The effect of atmospheric pollution on forest trees in Great Britain. *Smokeless Air*, London 23 (83), 1952 (12-6).

A general account, citing a few specific instances.

3098. FERDA, J. Vliv kouřových plynů na množství a poškození jehlic smrkových porostů. [Effect of smoke fumes on the number of, and damage to, needles in Spruce stands.] *Práce výzkum. Úst. lesn. ČSR* No. 5, 1954 (283-95). 20 refs. [Cz.cz. russ.g.]

[Cf. *For. Abstr.* 14 (No. 2349).] It was found that the needles of Spruce damaged by fumes (or at least by the SO_2 in them) contain ca. 5 times as much SO_2 as the needles of undamaged stands, the relative amount increasing with the age of the trees. The increase in SO_2 content is accompanied by needle cast and an increasing proportion of damaged needles. Needles in damaged stands are also smaller. The damage to needles reduces considerably (even below 50%) the assimilating surface of the stand.

3099. MATERNA, J. Jak škodi kouř s hlediska zařízení lesů? [Smoke damage from the point of view of forest management.] *Lesn. Práce* 33 (9), 1954 (403-5). [Cz.]

Discusses the available Czech data on the SO_2 content of Norway Spruce needles at different distances from the edge of a stand. Selection forest, usually recommended as providing the best protection for young trees against SO_2 , avails little in Czechoslovakia because the conventional species are too sensitive. The best solution is to use smoke-resistant broadleaved species. [Cf. also *For. Abstr.* 14 (Nos. 2349, 2350); 15 (No. 3684).]

3100. MIYAZAKI, S., OKINAGA, T., and HARATA, M. [The effect of fertilizer on the growth of Black Locust (*Robinia pseudoacacia*) seedlings transplanted in Kosaka bare lands and injured by the strong sulphate [sic] smoke.] *Bull. For. Exp. Sta. Meguro*, Tokyo No. 74, 1954 (177-90). 5 refs. [Jap.e.]

Gives, with English captions, a profile diagram and tables for the mechanical and chemical composition and exchangeable Ca of a soil subjected for years to sulphite fumes, and illustrates the growth of seedlings in response to 9 fertilizer treatments in tables and photographs, one of the latter, in colour, showing the foliage after 5 treatments. Compared with little or no growth in the control, increasingly better growth was obtained, after correcting acidity with Ca, by applications of K, P, N, and complete fertilizer, in that order. Seedlings with good growth also suffered less injury from fumes.

43. FOREST FIRES

3101. ENNEVAARA, P. Metsäpalot vuosina 1952–1953. [Forest fires in 1952–53.] *Acta for fenn.* 61 (12), 1954. pp. 17. [Fie.]

Statistics of number of fires, areas burnt, and causes of forest fires in Finland. Tables have legends in both English and Finnish.

431. *Predisposing Factors and Causes.* *Fire Danger. Fire Behaviour*

3102. INOUE, K. [On the control of forest fires in Hokkaido (I).] *Spec. Rep. For. Exp. Sta., Hokkaido No. 2*, 1954 (142–50). 10 refs. [Jap.e.]

Owing to climate and topography, the Hokkaido forests suffer the greatest fire damage in Japan, nearly all of it being of artificial origin. The onset of the fire season is connected with the day of general snow melting. This onset is in May, or in the south, at the end of April. Peak danger begins in mid-May and ends in June, the distribution of days with > 20 fires in these 3 months in 4 years of record being respectively 0, 5 and 1–2. On such days very low humidities at 9 a.m. (blue reaction with CoCl_2 paper) were noted. Well distributed rather than high total amount of rain at mid-May reduced damage. *From author's summary.*

3103. WILLIAMS, D. E. Water table level as an indicator of drought conditions. *For. Chron.* 30 (4), 1954 (411–6). 7 refs.

The effect of drought on heavy forest fuels is a basic factor in the Canadian Forestry Branch method of forest fire-danger measurement. A method is described whereby, from an analysis of water-table fluctuations, the drought-factor table may be revised to include the effects of seasonal variations. Measurements were made in an undrained Black Spruce swamp. The effects of precipitation and temperature on water-table level were determined and expressed in a formula that could be used to prepare a drought-index table. *Author's summary.*

3104. NELSON, R. M. Calibration of fuel moisture sticks used in the east and south. *Fire Control Notes* 16 (1), 1955 (40–2).

Describes the preparation and calibration of thin Basswood slats.

432. *Prevention and Control*

See also Nos. 2590, 2973.

3105. KERR, E. Eyes that don't grow sleepy. *Pulp Paper Mag. Can.* 55 (12), 1954 (152, 156).

One man in a central station can monitor up to 5 television cameras set up as tower watches [cf. *For.*

Abstr. 15 (p. 542), and a fire can be located immediately from the intersection of two bearings. The Louisiana State Forest Commission is experimenting with a set of these 'Detecto-vision' cameras supplied by the Louisiana Radio and Television Distributor's Company. Cost may be reduced to \$15,000 [? per set].

3106. Radio in the forest. *Timb. Tr. J.* 212 (4088), 1955 (113–4).

Thetford Chase, comprising 50,000 acres of continuous plantations, worth £6,000,000, situated in the exceptionally dry East Anglian climate, is particularly vulnerable to fire. The article describes the use of V.H.F. equipment for the control of fire-fighting parties and for the calling up (through land lines) of county brigades when reinforcements are required.

3107. NICHOLS, J. M., and KIHLMIRE, P. M. Fire line construction with forced air. *J. For.* 52 (12), 1954 (943–4).

Describes an improvised unit consisting of a crawler tractor, dozer blade and blower capable of cleaning litter off a firebreak 3–6 ft. wide at 50 chains/hour. This method has definite advantages, and improvements are under trial.

434. *Revegetation etc. of Burnt Areas*

3108. VALK, U. A. Opyty oblesenija suhih sosnovykh garei v Estonskoj SSR. [Trials in the artificial regeneration of dry Pine-heath burns in Estonia.] In *Naučnaja Sessija po Voprosam Biologii i sel'skogo Hožajstva, Riga, 22–26 Oktjabrje 1951g.* Akademiya Nauk SSSR, Moskva. 1953. pp. 217–27. [Russ.] H.S.B.

Presents selected data from studies on the micro-climate, soils, and regeneration of such burns, which have proved very difficult to regenerate in the past, and concludes that: (1) Complete tractor ploughing is the best method of soil preparation except on shifting sand, where strips should be ploughed at right angles to the prevailing wind. Depth of ploughing should be sufficient to bring the illuvial horizon to the surface. In the examples quoted, 25 cm. was sufficient, but where iron-pan lies not deeper than 50 cm., it would be necessary to deep-plough (50–60 cm.). (2) Scots Pine and Birch have grown well on ploughed sites, the latter outstripping other species in height. Alders (Common and Grey) have not so far given satisfactory results, but trials continue in view of good results reported from Latvia. Pine/Birch mixtures (5/1 or 4/1) are recommended. (3) The severe microclimate of burns makes direct sowing inadvisable in most cases; it is successful only where rainfall is adequate, and far better results are achieved by planting 2-year Pine. (4) Fire control is essential.

434. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See Nos. 2595, 2611, 2622–3, 2788, 3109, 3144.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also Nos. 2595, 2611, 2623, 2788, 3027.

3109. HUBBERT, H. Le problème du recours aux feux courants. [The problem of the use of surface fires.] [Proceedings] Technical Meeting, International Union for the Protection of Nature, Caracas 1952, 1954 (498-509). [F.]

Summarizes the effects of fire on different kinds of vegetation and suggests some conservation measures.

3110. LOTTI, T. Summer fires kill understorey hardwoods. *Res. Note Stheast. For. Exp. Sta. No. 71*, 1955. pp. 2. 1 ref.

Preliminary results of controlled burning in Loblolly Pine flatwoods in S. Carolina show that successive annual summer fires give better results than biennial fires and that 2 or 3 successive fires should control Sweetgum and Myrtle. Control where mixed Oaks and Blackgum predominate is less effective.

3111. McCLAY, T. A. Loblolly Pine growth as affected by removal of understorey hardwoods and shrubs. *Res. Note Stheast. For. Exp. Sta. No. 73*, 1955. pp. 2.

Plots established in 1946 were treated annually for removal of the understorey by summer burning, winter burning, or summer foliage spray with chemicals after initial burning. The spray eliminated the undergrowth in a few years, but a certain amount of resprouting occurred after the burning treatments. Increment borings showed that during the first 5 years from 1946 there was no increase of increment as the result of removing hardwood competition.

3112. RIEBOLD, R. J. Summer burns for hardwood control in Loblolly Pine. *Fire Control Notes* 16 (1), 1955 (34-6).

Tests have shown that summer fires can be used to reduce hardwood understoreys containing stems with diameters too large to be killed back by winter fires in middle-aged *Pinus taeda* stands. But the operation requires great skill and care and even so there is some risk of damage to the Pine overstorey.

3113. Coastal hardwoods: prescribed burning. *Rep. Dir. For. Qd. 1953/54*, 1954 (13).

Work has continued on experiments in controlled burning in the Spotted Gum/Ironbark type. Two burns have been made successfully with benefit to the increment of the valuable Eucalypts, a 54% kill of Wattle spp. and a 5% kill of Lantana. Though the Lantana coppiced after burning, its seed production was much reduced, and a third burn may well kill the seedlings.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. Weeds

See also Nos. 3010-1, 3061, 3110-3.

3114. BROWN, B. A., and HANSEN, H. L. Preliminary analysis of factors related to upland-brush density in Minnesota Pine stands. *Minn. For. Note No. 35*, 1955. pp. 2. 3 refs.

The better the site quality, the more serious the brush problem. Good Pine sites have average brush densities of 10,000-20,000 stems/acre. The rela-

tively slow initial invasion suggests that early recognition is essential to successful control.

3115. FRYER, J. D. The role of arboricides in bush and forest eradication. *J. Sci. Food Agric.* 6 (2), 1955 (73-8). 50 refs. [Department of Agriculture, Oxford University.] O.R.S.

Reviews world literature on the development and present use of arboricides and describes briefly some experimental work in Africa on evaluation of arboricides and defoliant as part of the general problem of tsetse-fly control, which shows that the synthetic growth regulators are promising. [Cf. *For. Abstr.* 16 (No. 614).]

3116. ANDERSSON, H. Kvarstående effekt av hormonderivat på träd och buskar. [Residual effect of hormone derivatives on trees and bushes.] *Växt-skyddsnotiser, Statens Växtskyddsanstalt, Stockholm* 1953 (4), (59-64). [Sw.] L.S.

The following species, severely affected by spraying with growth regulators in 1952, still showed the effects in 1953: *Rhamnus frangula*, *Prunus padus*, *Sorbus* sp., *Betula* spp. and *Salix* spp. The 2nd-year effects were shown in production of small misshapen leaves. It is possible that this is the cumulative effect of several years' spraying rather than the result of heavy spraying in 1 year.

3117. MARTIN, S. C., and CLARK, F. B. Controlling hardwood sprouts with foliage sprays. *Tech. Pap. Cent. St. For. Exp. Sta. No. 145*, 1954. pp. 10.

Results in the 3 years after spraying with NH_4 sulphamate or one of several 2,4-D or 2,4,5-T preparations, showed that sprout mortality was highest for the sulphamate. In general, mortality increased with herbicide concentration. Of the 5 species examined, mortality was least for *Quercus marilandica* and *Q. stellata* and highest for *Carya* sp. Sprout height and crown area were similar for all treatments, but slightly less on plots sprayed with sulphamate. Time of day and density of foliage before treatment had little effect on sprout mortality, but sprout clumps made up of many stems were more difficult to kill than those with only 1 or 2 stems.

3118. COULTER, L. L., and RALSTON, R. A. Aerial spray tests with 2,4,5-T for scrub Oak control in Lower Michigan. *Tech. Note Lake St. For. Exp. Sta. No. 424*, 1954. pp. 1.

One or 2 lb. of 2,4,5-T acid equivalent in 2.25 [U.S.] gal. of oil and water, applied at 2.5 gal./acre during August, defoliated or killed most of the Oak species overtopping a 15-year-old Red Pine plantation. One and 2 years after treatment the Pines were growing relatively free of overhead shade and without apparent injury from the spray. Costs (plane, chemical and overheads) are estimated at \$3.50/acre.

3119. Use of 2,4,5-T. *Rep. Dir. For. Qd. 1953/54*, 1954 (13).

The development of coppice, following the thinning of young Eucalypt stands, is a serious problem, and the application of dilute solutions of 2,4,5-T to cut stumps after thinning has shown great promise in preventing this. It is thought that stump height may have an effect in determining the concentration necessary for effective control.

Kills of up to 85% have also been obtained with *Eucalyptus pilularis* by injecting small quantities of a 5-10% solution into a number of basal axe-cuts. Indications are that cost of initial treatment and material will not exceed that of axe thinning. Plots for comparison of growth rates under both types of treatment have been established.

3120. DĚKATOV, N. E. Chemické prostředky proti bušení. (Použití chlorátů jako herbicidů v lesnictví.) [Chemical weed killers. (The use of chlorates as weed killers in forestry.)] *Lesn. Knihovna (malá Rada)* No. 3, 1950. pp. 127. [Cz.] Price Kčs.50.

Translation by S. Mudra from Russian. Includes sections on: efficiency of chlorates as weed killers; factors affecting the efficiency of chlorates; and their use in nurseries, plantations, and felling sites, in Russia.

442. Parasitic (Higher) Plants. Climbers and Epiphytes

3121. KULT, J. Some notes on the Larch mistletoe in British Columbia. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (6), 1954 (2).

The Larch mistletoe, *Arceuthobium campylopodum* f. *laricis*, which is common on *Larix occidentalis*, is by no means confined to this host. Infections have been noted on *Pinus monticola* and *P. contorta* associated with infested Larch, and on *Abies lasiocarpa* and *Picea engelmannii*. When occurring on the two latter species, the mistletoes resemble the so-called natural host forms, *abietinum* and *microcarpum* respectively, and it may be that all these forms (f. *laricis*, f. *abietinum*, and f. *microcarpum*) are more apparent than real, any superficial differences being attributable to their different hosts.

443. Fungi and Bacteria

See also Nos. 2586, 2698-701, 2717, 2725, 3086-7.

3122. Compounds active as fungicidal agents. (Data from preliminary screening tests.) Chemical-Biological Coordination Center, National Research Council, Washington. 1954. pp. 2 + 22. P.R.

3123. SINREICH, A. Pappelschädlinge und -krankheiten in Österreich in den Jahren 1951-1954. [Pests and diseases of Poplar in Austria during the years 1951-54.] *Anz. Schädlingssk.* 28 (1), 1955(1-5). 2 refs. [G.]

Lists insect pests damaging roots, leaves and wood, also fungus diseases occurring on Poplar during this period, with notes on the occurrence of outbreaks and their control.

3124. GYÖRFI, J. Krankheiten und Schädlinge der Pappeln in Ungarn. [Pests and diseases of Poplar in Hungary.] *Acta agronomica Academiae Scientiarum Hungaricae, Budapest* 2 (1), 1952 (41-79). 9 refs. [G.e.russ.] A.P.B.

Among bacterial diseases only *Micrococcus populi* and *Bacillus populi* have been recorded in Hungary. Fungus diseases, particularly those causing false heartwood, are of much greater significance. Species causing false heartwood are listed and described; the most important genera are *Pholiota*, *Pleurotus* and *Polyporus*. The most important of the wood- and leaf-attacking insects are also listed and commented

upon. Most important among the latter are *Melasoma populi*, *M. tremulae*, *Plagioderma versicolora* and *Phyllodecta vulgatissima*. Extensive damage to young plants is caused by cockchafer grubs. Damage from abiotic factors is comparatively rare. In general it has been observed that the larger the area covered by Poplar, the greater the number of pests and diseases. In small stands attacks of any kind were rare.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 2775, 2885, 2897.

3125. MAGNANI, G. Alcuni casi di deperimento di pioppelle in vivaio. [Some cases of dieback of Poplar in the nursery.] *Cellulosa e Carta* 5 (12), 1954 (14-5). [It.f.e.]

One-year seedlings, rooted cuttings, and fresh cuttings of Poplar in 3 nurseries in widely separated parts of Italy exhibited similar symptoms of dieback. Two species of *Fusarium* belonging to the *elegans* section of the *bulbigenum* group were isolated from some of this material, but gave negative results when inoculated into healthy plants. All the stock originated from a nursery near Padua where the soil (moist and sandy) gave optimum conditions for Poplar. The affected nurseries all have compacted soils and it is probable that this unfavourable milieu was the prime cause of the disorder, the *Fusarium* infection being secondary.

3126. VÁMOS, R. A fenyőcsemete dőlése. [Damping-off of Pine seedlings.] *Erdő* 3 (1/2), 1954 (34-40). 7 refs. [Hu.]

Results of pot experiments suggest that damping-off of *Pinus nigra* and *P. sylvestris* nursery seedlings is associated with factors leading to anaerobic conditions in the rooting zone and interference with the normal metabolism of the plant. The disorder failed to develop in sandy soil, even when it was inoculated with *Fusarium* from the roots of affected plants, but almost wiped out seedlings in clay soil, garden compost, or sand with > 50% clay admixture. The rhizosphere of diseased plants was densely populated with bacteria, forming a kind of sheath round the rootlets, and the plants contained 15-30% less N and K than healthy ones and showed symptoms of P deficiency. Conditions preventing the proliferation of bacteria (deficiency of organic matter and moisture) and measures that improved aeration (loosening of the soil, mixing sand with heavy soil) delayed the appearance of symptoms.

443.3. Diseases of Older Stages

3127. ZALESKI, K., and GOLENIA, A. Grzyby nadrzewne—paszożyty i saprofity—zebrane w Państwowym Nadleśnictwie Kórnik (woj. poznańskie) w latach 1948-1949. [Fungi—wood parasites and saprophytes of the Kórnik state forests (Province Poznań, Poland) collected in 1948-49.] *Acta Soc. Bot. Polon.* 23 (3), 1954 (617-34). 38 refs. [Pol.e.] O.B.D.

A list, with descriptions, of fungi collected from any kind of wood material in the Kórnik state forests, with accompanying data on soils, topography and climate. *From authors' summary.*

Stem, Butt and Root Rots; Root Diseases

3128. BARAT, M. H. Études sur les maladies du caféier et des arbres d'ombrage dans les plantations de la Côte Est de Madagascar. [Diseases of coffee and of shade trees in plantations on the east coast of Madagascar.] *Rech. agron. Madagascar, C.R. Insp. gén. Serv. agric* No. 2, 1953 (135-44). 12 refs. [F.f.] H.S.B.

Describes symptoms of infection by *Clitocybe tabescens* on Coffee and on shade trees (particularly *Albizia* spp.) and presents notes on the fungus and on control measures.

3129. NOBLES, M. K., and NORDIN, V. J. Studies in wood-inhabiting hymenomycetes. II. *Corticium vellereum* Ellis and Cragin. *Canad. J. Bot.* 33 (1), 1955 (105-12 + 1 plate.) 15 refs. O.R.S.

3130. GILMOUR, J. W. *Armillaria mellea* (Vahl) Sacc. in New Zealand forests. Part 1. In stands of *Pinus radiata* D. Don in Kaingaroa State Forest. *For. Res. Notes N.Z. For. Serv.* 1 (9), 1954 (1-32 + 8 plates). 21 refs.

A survey of the incidence of *A. mellea* was made over some 100,000 acres of *P. radiata* plantations, 20-28 years old, in order to determine the degree of parasitization of the trees by this fungus. No parasitic attack was observed, but there was extensive saprophytic attack, correlated with site quality, total mortality, and effective stocking.

3131. KARPINSKI, J. J. Wpływ grzybów jako przyczyna zamierania drzew w lesie naturalnym Białowieckiego Parku Narodowego. [Fungi as the cause of the death of trees in the virgin forest of the Polish National Park of Białowieża.] *Roczn. Nauk leśn.* No. 5, 1954 (137-60). [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 122.)

Observations on 1515 stems (from 7 sample plots in the 7 main forest associations of the National Park) showed that 660 stems were fungus-infected (the total number of cases was 935, many stems being attacked by more than 1 fungus); 87% of the fungi were identified (mostly by species, some by genus only). The concept of the biological value of a given fungus is characterized by the following index numbers: (1) index of activity (% of stems infected in relation to total number of stems examined); (2) index of distribution (% of stems infected in relation to total number of stems infected by any fungus species), and (3) index of participation (% of cases of infection by the species in relation to the total number of infection cases). The coefficient of biological value is defined as $(1) \times (2)/(3)$ and is determined for *Armillaria mellea* and *Fomes annosus* in each of the 7 biotopes. It follows from the results obtained that *A. mellea*, unlike *F. annosus*, depends more on soil moisture and pH than on humus content; hence the former seems to be a saprophytic fungus, the latter symbiotic and parasitic. *A. mellea* is not the primary cause of dieback; a primary infection by other fungi (*Fomes fomentarius*, *F. igniarius*, *F. pini*, *F. annosus*) usually opens the way for *A. mellea*. Other conclusions drawn from the investigations are that: drought-resistant Spruce [*Picea abies*] varieties can contribute to the control of *A. mellea*; only Spruce of local provenance

should be used for plantations; careful planting of Pine [*Pinus sylvestris*] seedlings contributes to *Armillaria* control.

3132. WEST-NIELSEN, G., and OKSBJERG, E. Om rodfordærverangreb II. Fortsatte undersøgelser over granens vækst og sundhed. [Damage by *Fomes annosus*. II: Further research on growth and health of Norway Spruce.] *Hedeselsk. Tidsskr.* 75 (14; 15), 1954 (336-43; 347-52). [Dan.] C.G.B.

[Cf. *For. Abstr.* 15 (No. 3729).] Long-term experiments using fertilizers with leguminous crops as an extra source of N have been carried out on Spruce planted in 1904-05 on heathland at Gludsted and Sevel. Results include the following: (1) Gludsted—A re-inspection in 1921 showed that needle colour was best where growth of leguminous plants was strongest, but soil conditions were not homogeneous and by the 1950s, the quality-class boundaries could not be related to the original plots. (2) Sevel—Plots were treated with combinations of 3 different fertilizer treatments with 5 different sources of extra N (leguminous crops, forest mull soil or needles of *Pinus mugo*). Early Spruce growth was good on plots (a) and (b) (grown with a mixture of leguminous plants, including broom and gorse, or with blue perennial lupin respectively) where the leguminous crops formed a close cover, and poor on plots (c) to (f) (grown with a mixture of birdsfoot trefoil and white clover; treated with 1 cu.m. of forest mull soil per 0.25 ha.; treated with 5 cu.m. of *P. mugo* needles per 0.25 ha.; or given no extra N, respectively). Both leguminous crops and Spruce failed when no extra fertilizer was added. Addition of P increased the number of root nodules and growth of leguminous crops. Measurements in 1953-54 showed that b.a. and diam. of Spruce were higher on plots (a) and (b) than on (c). Volume on plots (a) and (b) was higher where kainite, P and lime had been given than where kainite and P together or lime alone had been given. Stands on plots grown with leguminous crops, but given no fertilizer, had not closed 50 years after planting. Attack by *Fomes annosus* was severe on the limed plots and moderate on those given the other two fertilizer treatments, and in trees just outside the experimental area. In a supplementary experiment, the following results were obtained: (1) Volume increment and resistance to *F. annosus* were both slightly better on marled than on limed areas. (2) Increment in the marled areas was rather better where cultivation had been by trench plough, while in the limed areas there was little difference between trench- or subsoiler-ploughing. Attack by *F. annosus* on the marled area was similar for both forms of cultivation but on the limed area was higher for trench ploughing. (3) Increment was higher on plots with leguminous crops than on those with *P. mugo* as nurse, and the difference appeared to be significant. (4) There was a tendency on plots grown with leguminous crops towards a slight increase in increment with increasing addition of P, but damage by *F. annosus* increased with the larger additions.

3133. DOMAŃSKI, S. Badania nad biologią *Fomes igniarius* (Linn.) Fr. na białodrzewie (*Populus*

alba L.). [The biology of *F. igniarius* attacking White Poplar.] *Acta Soc. Bot. Polon.* 23 (3), 1954 (589-616). 28 refs. [Pol.e.] O.B.D.

Presents the results of studies on a 77-year-old tree and of experiments on artificial media with cultures obtained from various places in trees decayed by *F. igniarius*. Decay was present in the lower part of the trunk and reached to a height of 9-2 m. Three stages of white wood-rot were recognized. The incipient stage appeared as an intensive red-brown area, and both it and the intermediate stage produced a strong odour resembling methyl salicylate. Points of entry for the fungus seem to have been provided by branch scars, or by injury from *Cossus cossus* larvae. The bases of infection were in the heartwood, from which the fungus attacked the sapwood and produced channels of infection through which the cambium and bark were attacked and killed. Two phases of cambium and bark disease were distinguished. The first was characterized by a continuous and vigorous extension of the necrosis, and the second by a significant reduction in vigour of the fungus and by healing activity on the part of the tree. The pathological energy of the fungus in cambium and bark was correlated with the vigour of the mycelium in the stem. *From author's summary.*

3134. IGMÁNDY, Z. A kótalakú tapló [*Fomes obliquus* (Pers.) Fries] károsítása elegyetlen cser-állományban.] [Damage to *Quercus cerris* stands by *Fomes obliquus*.] *Erdőmérnöki Főiskola Évkönyve Sopron Budapest* 1951/52, 1953 (93-106). 3 refs. [Hu.russ.g.]

The fungus—most deadly pest of *Q. cerris* stands in Hungary—causes white rot of the heartwood. The sporophores are of two kinds: tuber-shaped, on the stem, mostly on snags, and tubular ones found in pockets that develop in the wood below the tuber-shaped sporophores. Basidiospores are generated sexually by the tubular sporophores. The extent of damage caused in a 52-year stand is given in detail.

3135. EDGERTON, C. W. A *Ganoderma* and its association with root rot of trees in Louisiana. *Journal of the Tennessee Academy of Science*, Nashville 29, 1954 (178). Title in *Bibliogr. Agric. U.S. Dep. Agric.* 18 (11), 1954 (91681).

3136. CAMPBELL, W. A., and MILLER, J. H. Windthrow of root-rotted Oak shade trees. *Arborist's News*, Wooster 18 (2), 1953 (18). L.S.

Polyporus dryadeus was responsible for root decay of wind-thrown Oaks at Athens, Ga. The presence of fruiting bodies of this fungus should be looked upon as indicators of a possible serious weakening of the root system.

3137. TOOLE, E. R. Rot and cankers on Oak and Honeylocust caused by *Poria spiculosa*. *J. For.* 52 (12), 1954 (941-2). 1 ref.

Dissections and numerous cultures taken from cankers produced only this fungus. Decay grew at a rate of 0.8 ft./year. The fungus probably affects not more than 1% of trees belonging to susceptible species, among which 3 Oaks and *Gleditsia triacanthos* are named. Any tree with this canker

on the first log is likely to be a total cull in 10 years or less.

3138. BUDDENHAGEN, I. W. *Phytophthora cinnamomi* (Rands) bij *Chamaecyparis lawsoniana* (Parl.) en *Taxus baccata* (L.) in Nederland. [*P. cinnamomi* on *C. lawsoniana* and *T. baccata* in the Netherlands.]. *Tijdschr. PLZiekt.* 61 (1), 1953 (17-8). [Du.] (Abstract of a paper presented at a meeting in Wageningen, Feb. 1955.) E.M.B.

Recorded in 1954. The symptoms are described and compared with those reported from other countries.

3139. *Phytophthora cinnamomi* Rands. *Distr. Maps Plant Dis.* No. 302 (rev.) 1955. pp. [2] [Commonwealth Mycological Institute, London.]

Wilts, Diebacks etc.

3140. MAŃKA, K. Dalsze badania nad przebiegiem holenderskiej choroby wiaźow (*Ceratostomella ulmi* (Schw.) Buisman) na terenie m. Poznania (w latach 1946-1953). [The course of Dutch Elm disease in the region of Poznań during 1946-1953.] *Acta Soc. Bot. Polon.* 23 (4), 1954 (785-805 + 1 tbl.). 24 refs. [Pol.g.] O.B.D.

A report on investigations made during this period. [Cf. *For. Abstr.* 15 (No. 2641).]

3141. HOFFMAN, P. F. Physiology of *Endonidophora fagacearum* Bretz, I. Factors influencing growth and toxin production. *Iowa St. Coll. J. Sci.* 29 (1), 1954 (27-38). 10 refs. O.R.E.

3142. MCKENZIE, M. A. Maple wilt. *Trees*, Cleveland, Ohio 14 (5), 1954 (6, 19-20). 25 refs.

A brief account of the symptoms and identification of the *Verticillium* wilt disease on *Acer saccharum* and *A. platanooides*, and its spread in Europe and America, and control. [Cf. *For. Abstr.* 10 (No. 2245).]

3143. CAROSELLI, N. E. *Verticillium* wilt of Maple. *Abstr. of thesis*, in *Dissert. Abstr.* 14 (12), 1954 (2186-7). [Brown University.] O.R.S.

Gives data on the effects of successful inoculations, variations of incidence of the disease with soil water and sapwood water, and the effect of soil treatments with $(NH_4)_2SO_4$, $NaNO_3$, Nugreen, Milorgonite, $CaCN_2$ and a 6-8-7 'tree food', in controlling the disease; the growth of strain V-10 in culture; the 10 strains distinguished from isolates grown on Czapek's medium; and the production of a metabolite antagonistic to strain V-10 by a soil actinomycete and a bacterium (*Bacillus subtilis*). The *Verticillium* is considered to be *V. alboatrum*.

Cankers, Stem Rusts etc.

See also No. 3137.

3144. PRONE, P. P. Fire as a predisposing factor in canker diseases of street trees. *Trees*, Cleveland, Ohio 13 (6), 1953 (9-10, 20). 4 refs.

An examination of London Plane trees in streets in New York and New Jersey suggests that damage by leaf fires in autumn may be a predisposing factor in attack by *Dothioria* sp. and *Ceratostomella* sp.

3145. BIRAGHI, A. Nuovi contributi alla conoscenza dell'agente del 'cancro della corteccia del

castagno'. [Recent contributions to the knowledge of *Endothia parasitica* disease of Chestnut.] *Monti e Boschi* 6 (1), 1955 (36-9). 2 refs. [It.it.f.]

Discusses the work of Bazzigher [cf. *For. Abstr.* 15 (No. 2642)] and Nienstaedt [cf. *For. Abstr.* 14 (No. 2403).]

3146. QUICK, C. R. Ecology of the Sierra Nevada Gooseberry [*Ribes roezlii*] in relation to blister rust control. *Circ. U.S. Dep. Agric.* No. 937, 1954. pp. 30. 19 refs.

3147. MARTIN, J. F., and GRAVATT, G. F. Saving White Pines by removing blister rust cankers. *Circ. U.S. Dep. Agric.* No. 948, 1954. pp. 22.

Gives advice on identifying *Cronartium ribicola* cankers, deciding whether trees are worth saving, removal of cankers from infected branches or stems, tools, care of wounds, and pruning and thinning in the forest. Supersedes *Fmrs.' Bull.* No. 1885 [cf. *For. Abstr.* 4 (p. 248).]

Foliage Diseases

3148. GREMMEN, J. Op *Populus* en *Salix* voorkomende *Melampsora*-soorten in Nederland. [*Melampsora* spp. found on *Populus* and *Salix* in the Netherlands.] *Tijdschr. PlZiekt.* 60 (6), 1954 (243-50). 5 refs. [Duc.] E.M.B.

Describes 9 heteroecious species, distinguished by their morphological and pathogenetic properties, found in the Netherlands on Poplars and Willows. Four species, *M. alii-populina*, *M. larici-tremulae*, *M. pinitorqua* and *M. alii-salicis-albae* are recorded in the Netherlands for the first time. These 9, and 6 other species that may be expected on Poplar and Willow, are listed, showing the alternate hosts.

3149. LIGHTLE, P. C. Experiments on control of *Elytroderma* needle blight of Pines by sprays. *For. Res. Note Calif. For. Range Exp. Sta.* No. 92, 1955. pp. 6. 2 refs.

Eight commercial fungicides tested in late summer in 1952 and 1953 failed to control *E. deformans* on Ponderosa and Jeffrey Pines. Possible reasons for the failure are (1) re-infection by ascospores in autumn after the sprays had been washed off or diluted or (2) infection in spring or early summer by ascospores or pycnidiospores, before the sprays were applied.

3150. GOIDANICH, G. Unusual incidence of diseases affecting economic plants in Northern Italy. *FAO Plant Prot. Bull.* 3 (1), 1954 (4-7). 1 ref. I.M.I.

Aesculus hippocastanum has lately been subject to a leafspot disease caused by *Guignardia aesculi* which has continuously increased in recent years, and is now conspicuous throughout Italy. Large chlorotic spots darken in the centre to brick-red while the yellow halo spreads over the leaf with abundant pycnidia on affected parts. Yellowing in August is followed by heavy defoliation in Sept. Individual trees in diseased groups remain unaffected.

3151. ENDE, G. VAN DEN. Het parasitaire karakter van *Septotinia populiperda*. [The parasitic character of *S. populiperda*.] *Tijdschr. PlZiekt.* 60 (6), 1954 (253-5). 4 refs. [Duc.] E.M.B.

Cuttings of *Populus candicans*, *P. marilandica* and *P. brabantica* were sprayed with suspensions of the

ascospores. Leaf blotches formed only when leaf injuries were already present. *P. candicans* proved the most susceptible species. Spraying the upper or lower leaf surface was equally effective. Germination of the ascospores was prevented by Cu concentrations (Bordeaux mixture or CuSO_4) of 7-8 mg. Cu/litre.

3152. BUDDENHAGEN, I., and YOUNG, R. A. A new *Phytophthora* leaf and twig blight of English Holly in Oregon. *Plant Dis. Repr.* 38 (10), 1954 (723-4). 5 refs. A.P.B.

The disease, caused by an as yet unidentified species of *Phytophthora*, consists of black leaf-spotting, subsequent defoliation, and development of twig cankers. It develops during cool, rainy weather and subsides during the warm dry months. No field experiments in control have yet been undertaken.

45. DAMAGE BY ANIMALS

See also Nos. 2583, 2725.

451. Mammals

See also Nos. 2641, 2643, 2788, 2938-9, 2954, 2973.

3153. PAAVER, K. O rasprostraneni i ekologii myševidnyh gryzunov—vrediteli lesa v Ėstonskoj SSR. [The distribution and ecology of small rodents—forest pests in Estonia.] In *Naučnaja Sessija po Voprosam Biologii i sel'skogo Hozjajstva*, Riga, 22-26 Oktjabrja 1951g. Akademija Nauk SSSR, Moskva. 1953. pp. 238-42. [Russ.] H.S.B.

The species recorded in Estonian forests are listed. Only *Clethrionomys glareolus* and *Apodemus flavicollis* are sufficiently widespread and abundant to cause serious damage. Their biology is briefly described and some instances of damage to Oak and Larch plantations (the Oak 'nest'-sown) discussed. In view of the planned use of Oak on a wide scale, research on control measures is urgently needed.

3154. SCHINDLER, U. Mäuseschäden und Mäusebekämpfung in Niedersachsen während der Erdmausmassenvermehrung 1951-1953. [Mouse damage and control in lower Saxony during the vole outbreak in 1951-53.] *Forstwiss. Cbl.* 73 (7/8), 1954 (240-51). 10 refs. [G.]

The most important species causing damage were: *Microtus agrestis*, *M. arvalis*, *Clethrionomys glareolus*, *Arvicola terrestris*, *Apodemus sylvaticus* and *A. flavicollis*. Information is presented on financial loss, species attacked, populations, natural enemies, control and its costs.

3155. KULICKE, H. Erkennung und Bekämpfung der Erdmaus im Walde. [Recognition and control of *Microtus agrestis* in the forest.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutzzier. Schäd.)* No. 10, 1953. pp. 7. 4 refs. [G.]

3156. UEDA, M. [Studies on the distribution of field mice. (7) The species of field mice, the distribution and seasonal fluctuation in afforested land from 1951 to 1953.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (106-11). 4 refs. [Jap.e.]

A preliminary study (1951-53) of forest mouse populations in Hokkaido. *Clethrionomys rufocanus bedfordiae*, most abundant in 1951, became less in 1952 when *Apodemus ainu ainu* and *A. geisha* increased. *C. rutilus mikado* were very few. In 1953 the population of the 3 commoner species was very low. Counting was by the mark-and-release method. *From author's summary.*

3157. KUWAHATA, T. [Studies on the distribution of field mice in Hokkaido (9). Note on the life condition of field mice in afforested land and surrounding forest land in the Ikutara district forest office.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (119-25). 2 refs. [Jap.jap.e.]

Clethrionomys rufocanus bedfordiae is the typical vole of these stands, and damper rather than drier conditions favour it. Strip-weeding young plantations renders them less favourable to this and to *Apodemus geisha* than neighbouring forest land. *From author's summary.*

3158. HIGUCHI, S. [On the activity of Bedford's red-backed vole [*Clethrionomys rufocanus bedfordiae*] in the afforested stands in the southern part of Hokkaido.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (126-32). [Jap.e.]

A study of winter population distribution with notes on extent of territory and range (maps) in relation to snow depth and grass and litter under it. Closer laying of poison in denser vegetation is indicated. Weed burning before planting may create unfavourable conditions for the vole in the early life of the plantation. *From author's summary.*

3159. MAEDA, M. [Studies on the mechanism of damage to forest trees by field mice. (I) On the relations between the lack of food and occurrence of damage to planted trees.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (133-41). 28 refs. [Jap.e.]

A study of the effects of lack of food, kind of food, and length of fast on the damage done to Larch by *Clethrionomys rufocanus bedfordiae*. *From author's summary.*

3160. KINOSHITA, E., and SHIBATA, Y. [Studies on the mechanical control of field mice. I. The effects of control on field mice by trench.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (112-18). 2 refs. [Jap.e.]

Two areas of planted Larch (ca. 1.25 and 1.50 ha.) were each surrounded by a trench respectively 40 × 60 and 45 × 61 cm. wide and deep, with traps set at 20-m. intervals. The numbers and species of rats and mice caught in, and those that crossed, the trenches are listed. Such trenches are very effective if well made. *From authors' summary.*

3161. UDAGAWA, T. [Studies on the extermination of field mice IV. A moderate size of poisoned bait.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 74, 1954 (109-16). 4 refs. [Jap.jap.e.]

Mice cannot carry away (and waste) bait smaller than a given size which varies with the species e.g. *Clethrionomys* (2 species) were able to take away bait of sizes down to 10 mesh; *Microtus*, 9 mesh; *Apodemus*, *Rattus* (2 species) and *Mus*, 8 mesh. None could take away smaller sizes e.g. 11 mesh. For economy in bait laying, husked millet (mesh 11) at

2-6 kg./hectometre is recommended. *From author's summary.*

3162. ČENCOVA, N. J. Otravlenne primanki dlja borby s gryzunami v lesnasaždenijah. [Poison baits for rodent control in forest plantations.] *Lesn. Hoz.* 5 (6), 1952 (81-2). [Russ.]

Oats and wheat treated with Zn_3P_2 (5% by weight) and placed in holes 20-30 cm. deep (20 g./hole; 100 holes/ha.) have been found highly effective against mice and voles in forest plantations. Results, showing kills of between 67 and 83%, are tabulated. Less labour-consuming is the scattering of bait by hand ($\frac{1}{2}$ hour/ha. versus 8 hours) or from the air. Danger to birds is negligible, as the majority even of granivorous birds feed on insects during the period of nesting and feeding their young. Thus in the region of Stalingrad, on 9 June, treated oats were scattered by hand over 0.02-ha. patches at 200 g./patch, or 5 times the usual rate, round the nesting sites of 10 pairs of buntings (yellowhammer and ortolan), without mortality; in the same region, on 16 May, treated barley (10-15% Zn_3P_2 by weight) was also scattered from the air (2 kg./ha.) over ca. 5 ha. of shelterbelts without mortality. To shorten the period of toxicity, flour paste should be preferred to vegetable oil in preparing baits.

3163. KIRSCHNER, R. Waldschäden durch den Gartenschläfer. [Forest injuries by the garden dormouse.] *Anz. Schädlingsk.* 28 (1), 1955 (9). [G.]

Barking of trees, discovered in the Tyrol in July 1954 and consisting of strips 4-10 cm. wide extending more than half round the stem, was found to be due to *Eliomys quercinus*. Control with rat poison has been tried.

3164. KANGUR, R. Shrews as tree seed eaters in the Douglas Fir region. *Res. Note Ore. Bd. For.* No. 17, 1954. pp. 23. 5 refs.

The study showed that shrews (*Sorex* spp.), though classed as insectivores, were eating great quantities of Douglas Fir seed (50-100% of seed in acceptance spots) and much Sitka Spruce seed (15-55%), which is usually considered to be safe from seed-eating rodents.

452. Birds

See No. 2940.

453. Insects

See also Nos. 2583, 2586, 2654, 2717, 2725, 3086, 3123-4.

3165. LEKANDER, B. Skogsinsekternas uppträdande i Sverige under tiden 1946-1950. [The occurrence of forest insects in Sweden during the period 1946-50.] *Medd. SkogsforsknInst., Stockh.* 44 (1), 1954. pp. 46. 11 refs. [Sw.g.] Price Kr.2.

[*Cf. For. Abstr.* 12 (No. 3423).] It is proposed to publish similar reviews of forest insects in Sweden every 5 years.

3166. LOZOVŌI, D. I. K voprosu o massovom razmnoženii vrednykh nasekomykh v lesnykh i parkovykh nasaždenijah Zakavkazja. [The mass reproduction of insect pests in the forests and parks of Transcaucasia.] *Izv. Akad. Nauk armjansk. SSR (biol.*

sel.-hoz. Nauki 7 (5), 1954 (41-52). 26 refs. [Russ.] N.C.L.

Reviews literature with a bearing on factors contributing to mass outbreaks of insects in the region, concluding that: (1) Climate is extremely important, largely owing to the great inconstancy of the weather. Sudden droughts favour barkbeetle outbreaks, but drought may be unfavourable to defoliators, which are on the whole not a serious problem on conifers and much less important even on deciduous species than in other countries. (2) Unfavourable soil conditions tend to restrict populations of insects, such as chafers, that spend a part of their life in the soil. (3) Subjects such as competition, natural enemies etc. have been little studied in the region. It seems probable that the low incidence of attack by defoliators reduces the chances of attack by secondary pests. Insect outbreaks are usually of short duration, often > 1 year, and this gives little opportunity for a corresponding build-up of parasites and predators. (4) Fire damage is not very important as a factor in insect outbreaks in the region. (5) Destructive forest exploitation and consequent erosion have contributed largely to outbreaks.

3167. MAHNOVSKIĬ, I. K. Ozdorovlenie arčevnikov Uzbekistana. [Improving the health of the Juniper forests of Uzbekistan.] *Lesn. Hoz.* 5 (6), 1952 (62-5). [Russ.]

Over 64% of the total area of the mountain forests of Central Asia are under Junipers; most of the Juniper forests lie in Uzbekistan, where they cover 607,700 ha. in the upper catchments and therefore perform an important protective role. They are, however, in poor condition through neglect to remove slash and casualties (the forests are worked for fuel) which, the author asserts, has resulted in heavy insect infestation of both tree and seed. Thus in the Babatag forest district alone (9500 ha) 73% of the Juniper were found infested with *Anthaxia conradti*, 20% with *Phloeosinus turkestanicus*, and 3-4% with *Semanotus semenovi*; and 51% of the seed with *Coleophora* sp. and *Megastigmus juniperi*. Comparative data for 1939-49 indicate the heaviest seed infestation in 1947, a poor seed year, when the following incidences were recorded: *J. seravschanica* by (a) *M. juniperi* 86%, by (b) *Coleophora* sp. and *Rhagoletis turanica* 98%. *J. semiglobosa* by (a) 85% and (b) 94%. *J. turkestanica* by (a) 70%, (b) 100%. The majority of the Junipers, however, namely those that have retained at least 25% of their foliage and with an infestation averaging 120 *Phloeosinus turkestanicus* per tree, are withstanding the attack well. They can be saved by setting trap logs. These should have thin bark and be set (1-3 per ha.) in late autumn, winter or early spring, removed in June-July, and burnt.

3168. GÄBLER, H. Die wichtigsten Schadinsekten in Forstsämereien. [The most important insects damaging forest [cones and] seed.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutz tier. Schäd.)* No. 11, 1954. pp. 11. 2 refs. [G.]

Discusses with illustrations the damage done by various larvae.

3169. OSSOWSKI, L. L. J. Notes on insects observed [damaging Wattle plantations] during the period 1953-1954. *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (44-8).

[Cf. *For. Abstr.* 15 (No. 1572).] *Acanthopsycha junodi* increased considerably, over 132,000 acres being now infested and $> 15,000$ completely defoliated. In some parts of all but one (Zululand) of the areas mentioned, the eruptive stage was reached this, and the abatement stage is expected next, year. Findings for the % mortality due to *Isaria*, *Entomophthora*, polyhedral wilt, Diptera, Hymenoptera, spiders, birds and rodents, and unknown agents, are tabulated for each month March-Aug. for some 48,500 bagworms. *Hypopholis sommeri* seems to be steadily increasing (5500 acres damaged). The other pests mentioned in the abstract cited have decreased, the decrease in *Eulepida mashona* being attributed to the extensive spraying and fogging of the last 3 years and to the use of soil insecticides in new plantations. Frog-hopper decrease is attributed to cold, wet weather. New pests recently reported include the lasiocampid *Mesocelis montana*, army worm (*Laphygma exempta*) and the beetles *Pyonopsis brachyptera*, and *Sinoxylon ruficorne*.

3170. HENSON, W. R. A sampling system for Poplar insects. *Repr. from Canad. J. Zool.* 32, 1954 (421-33). 7 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 172.)

The foliage of *Populus tremuloides* appears as a remarkably constant number of leaves on each twig of the current year's growth. The statistics of these bunches of leaves are derived, and it is shown that the number of leaf bunches may be used as a measure of the number of leaves. The distribution of foliage over the crown of Poplar is described. The characteristics of leaf area, length, and width are derived, and a technique is described for correcting data based on leaf number for size of leaf. The distributions of a number of organisms infesting Poplar are discussed. A comparison of the amount of unassigned variance in these distributions is made in order to detect the most variant organism for sampling purposes. A sampling system with preimposed limits of precision and confidence is designed on the basis of the distribution of the foliage and of the most variant organism with respect to foliage. The sampling system is tested both for the organism for which it was designed, and for another organism. It is shown that satisfactory figures for density for all organisms included in the study may be obtained in one sampling operation. Various methods of expressing population data and the use of a correction factor for leaf size are discussed. The possible need for continued modification of the sampling system to take into account changes in field conditions is discussed. The technique for such examination and for redesigning the sample is outlined. *Author's summary.*

3171. WELLINGTON, W. G. Atmospheric circulation processes and insect ecology. *Repr. from Canad. Ent.* 86 (7), 1954 (312-33). 41 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 138.)

Describes briefly the more important types of air mass affecting weather and climate in North

America, with an example of how some principles of air-mass climatology may be used in investigating variations in insect mortality. An account is also presented of methods of studying climatic variations that show the part played by atmospheric circulation processes. An example illustrates the association between forest tent caterpillar outbreaks and increasingly frequent invasions of an area by southern and southwestern cyclonic centres. Indirect as well as direct effects of climate on population densities must be considered, and climate must be studied before, rather than during outbreaks. It is considered unwise to attempt direct correlations between population changes and variations in sun-spots or ultraviolet radiation, when due regard for the effects of atmospheric circulation processes can often produce more trustworthy results. *From author's summary.*

3172. METCALF, R. L., MARCH, R. B., FUKUTO, T. R., and MAXON, M. The behaviour of Systox-isomers in bean and citrus plants. *J. econ. Ent.* 47 (6), 1954 (1045-55). 14 refs.

The penetration, translocation, absorption and metabolism of radiotracer preparations of the thiono and thiol isomers of Systox are compared and their toxicity to thrips and mites evaluated. Applications in citrus included the roots, bark and leaves. Air drawn off from the shoot showed for these two plants no radioactive vapour. With the thiol isomer, movement to the upper leaves was 5-10 times faster and contact toxicity to the insects under study was 3-5 times greater than with the thiono isomer.

3173. BRUNS, H. Internationale Konferenz über die Auswirkungen moderner Insektizide auf Säugetiere, Vögel und Insekten. [International conference on the effects of modern insecticides upon mammals, birds and insects.] *Anz. Schädlingsk.* 28 (2), 1955 (25-8). 104 refs. [G.]

Presents a brief review of the present state of knowledge on the subject, as revealed at the 1954 Copenhagen Conference of the International Union for the Protection of Nature, with a comprehensive bibliography.

3174. CLOWER, D. F., and MATTHYSSE, J. G. Phytotoxicity of insecticides in mist concentrate type formulations. *J. econ. Ent.* 47 (5), 1954 (735-8). 2 refs.

A study of the effects of overdoses of 8 insecticides and 4 acaricides on certain species (while in leaf) of *Acer*, *Tilia*, *Salix*, *Aesculus*, *Quercus*, *Pinus*, *Ulmus*, *Populus*, *Carya*, *Alnus* etc. The least injurious were the insecticides isodrin, aldrin, dieldrin and D.D.T. and the acaricides ovotran, chlorobenzylate, and compound 923. *From authors' summary.*

3175. INOUE, M., and HIRASA, T. [Plant injury by wettable BHC powders used as an insect control spray.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (93-100). 3 refs. [Jap.e.]

Spraying with γBHC 5% powder (27-180 g./18 litres water) gives good control of underground insects, but at 4.5 litres/sq. m. swellings appeared at the base of many Larch seedling stems, serious injury being done to those 20-30 days old; this

dosage, however, is relatively safe for seedlings 60 days old. *From authors' summary.*

3176. ANDISON, H. Positive-flow band applicator for granular soil insecticides. *Publ. Dep. Agric. Can.* No. 916, 1954. pp. 6.

Describes and illustrates an apparatus designed at the Entomology Laboratory, Victoria, B.C., to ensure even application of insecticidal dusts to soil.

3177. DÜNNBEIL, H. Die sowjetische Spritz- und Stäubemaschine OKS. [The Russian OKS combined sprayer and duster.] *Wald* 2 (4), 1952 (117-8). [G.]

The machine shown at the 1951 Leipzig fair is a mist blower for spraying or dusting ('wet' or dry). In spraying, the liquids (suspensions, emulsions or solutions) are pumped at 20-25 atm. pressure into a nozzle surrounded by a high-pressure blower that reduces the droplets to a fine mist which is blown into the trees at ca. 75-80 m./sec. In dusting, heights of at least 15 m. and under favourable convection conditions up to 25 m. are reached. For 'wet' dusting a relatively small quantity of water is passed through the nozzle and atomized to moisten the dust simultaneously emerging through the blower. Wet dusting may reduce dust requirements by as much as 50%. Power is supplied by a 30-40 h.p. tractor. The tank, holding ca. 620 litres, is filled automatically. [The dust-container capacity is not stated.] Total weight is 925 kg. The performance per 8-hour day is 12-20 ha. in mist spraying and 20-35 ha. in dusting. Owing to its size, the machine must generally be used from roads, rides etc. If difficult going slows down the tractor motor, pressure and air velocity in the blower and hence the effective range, are reduced.

3178. HAMILTON, C. C. Developments in mist blower spraying. *Trees, Cleveland, Ohio* 15 (2), 1955 (8-9, 20, 22, 30).

Discusses types of machine and some examples of their use in control of *Toumeyella liriodendri*, in dormant spraying of Holly against *Aspidiotus* sp., and in control of *Scolytus multistriatus* on Elm and of various pests on Oak.

Isoptera

3179. ROONWAL, M. L. Biology and ecology of oriental termites (Isoptera). No. 1: *Odontotermes parvidens* Holmg. and Holmg. severely damaging the bark and contributing to the death of standing Teak trees in Uttar Pradesh, India. No. 2: On ecological adjustment in nature between two species of termites, *Coptotermes heimi* (Wasm.) and *Odontotermes redemanni* (Wasm.) in Madhya Pradesh, India. *Journal of the Bombay Natural History Society, Bombay* 52 (2/3), 1954 (459-67 + 3 plates). 4 refs. O.R.S.

(1) Standing Teak in Gorakhpur Forest Division, Uttar Pradesh, was severely damaged by *O. parvidens*. The termite destroyed the bark and bast, exposing and killing the cambium, and causing a 'girdling' effect. This injury, allied to drought, killed many trees. *O. parvidens* was also found damaging, but not killing, *Shorea robusta*.

(2) A recently dead Salai (*Boswellia serrata*) was attacked at the same time by two species, *O. redemanni*, feeding on the surface of the sapwood, and *C. heimi*, attacking the inner heartwood.

Hemiptera

See also Nos. 2628-9, 3021.

3180. TEUCHER, G. Die Douglasienwollaus (*Gilletteella cooleyi* Gill.) [*Adelges cooleyi*.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschut. tier. Schäd.)* No. 15, 1954. pp. 4 + 12 photos. 5 refs. [G.]

Systematic status, biology, distribution, and causes of mass outbreaks, susceptibility of different races of Douglas Fir, nature of the damage, and control.

3181. BALCH, R. E. Spread of Balsam woolly aphid [*Adelges piceae*] in relation to climate of Newfoundland. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (6), 1954 (1).

A. piceae has been present in Newfoundland for ca. 15 years. Rate of spread has averaged less than 5 miles/year and is probably limited by the direction of the prevailing summer winds.

3182. CLARK, R. C., BROWN, N. R., and SMITH, B. C. Biological control of Balsam woolly aphid [*Adelges piceae*.] *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (6), 1954 (1).

Of the European predators released in New Brunswick in 1951-54, *Laricobius erichsonii* and *Pullus impexus* appear to have established themselves.

3183. VIVANI, W. Note biologiche sull'afide lanigero del pioppo (*Phloeomyzus passerinii* Signoret). [Biological notes on the Poplar woolly aphid, *P. passerinii*.] *Cellulosa e Carta*, Roma 6 (1), 1955 (7-12). [It.f.e.]

Describes the development and life history of the insect and explains the methods used to test the resistance of different Poplar clones. Results of tests show that 'Canadian Poplar', *P. euroamericana* f. I 28 and f. I 65 are very susceptible, whereas I 214 and I 455, 'Caroline Poplar' and *P. alba* Linn. are almost immune.

3184. PAŠEK, V. *Pterocomma tremulae* CB. 1940, nový škodca kanadského topol'a. [*P. tremulae*, a new pest of 'Canadian' Poplar.] *Práce výzkum. Úst. lesn. ČSR* No. 5, 1954 (151-61). 5 refs. [Slovak.russ.g.]

Describes the outbreak of this pest on *Populus canadensis* Moench = *P. deltoides* Marsh [sic] near Banská Štiavnica in Slovakia during 1951-53.

Lepidoptera

See also Nos. 2630-1.

3185. PATOČKA, J. Housenky škodící na listech topolů. [Larvae that damage Poplar leaves [in Czechoslovakia].] *Práce výzkum. Úst. lesn. ČSR* No. 5, 1954 (163-282). 36 refs. [Cz.russ.g.]

The introductory part includes instructions for collecting and preparing larvae in general, description of their morphology, and general remarks on their biology, ecology, and damage done. The second part lists 20 families of Lepidoptera to which the pests in question belong, and gives

indications of the time when they appear, their life-cycle, damage done by different species, measures of prevention and control etc. The paper also includes a brief key for identifying the larvae.

3186. TRIPP, H. A. Description and habits of the Spruce seedworm *Laspeyresia youngana* (Kft.) (Lepidoptera: Olethreutidae). *Repr. from Canad. Ent.* 86 (9), 1954 (385-402). 14 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 154.)

3187. DAVIAULT, L. Aerial spraying against the Spruce budworm in Quebec in 1954. *Rep. Sth. St. Lawrence For. prot. Ass.* 1954, 1954 (29-32).

An examination of study areas within the 318,365 acres of Balsam Fir sprayed in the early summer of 1954 showed high budworm mortality on the sprayed areas and lighter defoliation and egg-laying than in surrounding unsprayed areas.

3188. LÖHRL, H. Merkwürdiges Ende des Evidenzbestandes einer Eichenwickler-Population (*Tortrix viridana*). [An unusual end to the visible stage of a *T. viridana* infestation.] *Anz. Schädlingssk.* 28 (1), 1955 (5-7). [G.]

Describes how an infestation of *T. viridana* was indirectly brought to an end through a mass flight of cockchafer, which, destroying practically all the available sources of food, set up a chain of events that eventually wiped out the *T. viridana* populations.

3189. RIPLEY, L. B., and WEBB, D. v. W. Aerial oil-spraying of Wattle plantations against bagworm. *Fmg. S. Afr.* 29 (343), 1954 (495-8 + 1 plate). E.M.B.

A report on successful aerial spraying operations carried out in 1952 and 1953 with toxaphene in light diesel oil. In the 1953 operations 10% toxaphene was used, giving (at 3 gal./acre) 3 lb. toxaphene/acre. [Cf. *For. Abstr.* 15 (No. 2682).]

3190. INOUE, M., KOIZUMI, C., and TAKAI, M. [Studies on the Pine moth (*Dendrolimus superans* Butler) found at Tsubetsu in Hokkaido (II).] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (87-92). [Jap.e.]

The life cycle in Hokkaido takes more than one year, the insects overwintering as larvae which pupate as 6th, 7th or 8th instars, the period of larval growth being approximately the same in the same environment. A mean day temperature of > 15° C. suits larval activity; below 10°, activity ceases and hibernation begins. A constant temperature of 10° probably does not favour activity. *From authors' summary.*

3191. KOCH, M.; KROLL, [R.] Giftrung und Ringspritzer, das neue Verfahren zur Bekämpfung waldbaulicher Schädlinge. [Poison ring and ring-sprayer, the new method for combating forest pests.] *Wald* 2 (1; 4), 1952 (13-4; 111). [G.]

Koch describes a method, based on that developed by Prell (1947), of combating *Dendrolimus pini* and *Lymantria monacha* by spraying the DDT preparation Duolit in a ring round stems on the smooth bark at a height of 3-5.4 m., and the special knapsack sprayers used. Both 1- and 2-man models have a number of nozzles arranged on a curved distributor (with a guide rail to maintain the correct distance between nozzles and stem), connected to the pressure

tank by a sectional feed-pipe and rapid-action valve, the whole designed to deliver the minimum amount of insecticide for effective coverage. In the 1-man models for trees of 32 cm. diam., the distributor is U-shaped; in the 2-man model, for trees of 32-45 cm. diam. each man carries a separate, identical unit, and the distributors are semicircular so that they fit together to form a complete ring. Patents have been applied for. In one test 800 Pine trees were treated in 1 hour. Kroll comments that from his successful experience with simple sprayers used on the rough bark lower down the stem, it should be unnecessary to make the rings at 4 m., on the smooth bark, against *D. pini*, but does not contest the need for higher spraying against *L. monacha*.

3192. GÄBLER, H.; KROLL, R. Giftspritzi-methode mit neuen Mitteln. [The poison ring spray method with new preparations.] *Wald 2* (1; 4), 1952 (19-21; 109). [G.]

Stresses the high cost of the method using the older insecticides such as Duolit, Gesolit or Mutoxan, and reports on successful trials with the new, cheaper preparations (1) 3204F and (2) Emulsion 3218 (marketed as 'Duolit Extra 20') developed by VVB Sapotex, Chemnitz, against *Dendrolimus pini* in the Schönfeld and Heidehäuser districts and against *Lymantria monacha* in the Schmannewitz district. Tables show results in terms of dead larvae for these preparations, with Gesolit or Duolit as controls. In these (2) was variously diluted with water, and proved equal to Duolit in effectiveness even at a dilution of 1 : 19, though it is provisionally recommended that in practice the dilution should not exceed 1 : 10 pending further trials. A further table shows egg-count figures for *L. monacha* in various compartments in two forest districts, in the year of treatment and the ensuing year, for Duolit-ringed and control plots.

Apart from cheapness, it is claimed as an advantage of the ring method that parasites are not destroyed. Kroll's comment claims that, in large-scale trials in Sachsen-Anhalt, treatment with Mutoxan emulsion (which can be diluted with water to a concentration of 3-6%) was effective and not costly.

3193. RUDNEV, D. F., and ZAGAĖKEVIČ, I. K. Metod toksičeskikh pojason v bor'be s sosnovym šelkoprijdom. [Poison rings [on stems] against *Dendrolimus pini*.] *Lesn. Hoz.* 5 (7), 1952 (56-7). [Russ.]

On the basis of trials, advocates the painting of rings ca. 10 cm. wide of DDT (50 g./litre of kerosene) on the stems, this method being more economical in material and labour than dusting from the air.

3194. KALANDRÁ, A., and KOLUBAJT, S. Nový kalamitný výskyt brourovce borového (*Dendrolimus pini* L.) v Polabi v roce 1949 a letecký boj Gesarolem proti němu. [A new mass outbreak of *D. pini* in the Elbe valley in Bohemia in 1949, and its control with Gesarol dusted from aircraft.] *Práce výzkum. Úst. lesn. ČSR* No. 5, 1954 (111-49). 45 refs. [Cz.-russ.e.]

Previous mass outbreaks of *D. pini* in Bohemia are described. In 1949, this pest attacked *Pinus sylvestris*, *P. strobus* and *P. banksiana*; the outbreak

followed the catastrophic drought of 1947 and was accompanied by outbreaks of other pests. The area attacked increased from 220 ha. in the spring to 350 ha. in the autumn; all age classes suffered. The insect pupated between 12 June and 15 July. New eggs were found as early as 26 July, and the first new larvae on 10 Aug. Dusting from aircraft (8-10 June) reduced the swarming, and autumn saw the outbreak checked.

Another dusting followed in Sept. at 50 kg./ha. The effect of Gesarol on different development stages of the insect and on its parasites is described.

3195. YUDELEVICH, M. La cuncuna de los pinos. [*Dirphya anphimone*.] *Chile maderero* 4 (7), 1954 (1, 3-4). [Span.]

Presents a description of this hemileucid defoliator of a large number of plants, including important trees such as Pine and Poplar. In Chile it is found in the area lying between Cognimbo and Malleco. Larval emergence coincides with season of greatest growth, but outbreaks are rarely of an intensity to constitute a serious threat to the forests. Chemical control is only advisable when the infestation covers some considerable area; DDT has proved successful, but chemical sprays tend also to eradicate parasites, which are numerous and evidently exercise considerable control.

3196. KINGHORN, J. M. The influence of stand composition on the mortality of various conifers, caused by defoliation by the Western Hemlock looper [*Ellopia fuscicollis lugubrosa*] on Vancouver Island, British Columbia. *For. Chron.* 30 (4), 1954 (380-400). 10 refs.

In the first year after the collapse of the outbreak in 1946, tree mortality was light and only totally defoliated trees died. During the 2nd and 3rd years, mortality increased considerably, but by 1950 it had declined, surviving trees had recovered, and cumulative mortality up to 1950 was taken as the total suffered in the outbreak. In *Tsuga heterophylla*, *Abies amabilis* and *Picea sitchensis*, larger trees suffered a higher mortality % for all defoliation classes than smaller trees, and mortality increased with % of defoliation. Differences in mortality rates in crown, aspect, and altitudinal categories are explicable in terms of diameter or defoliation differences. In Douglas Fir, mortality was higher in the smaller trees. Equations have been established by multiple regression to show the relation of basal-area mortality to stand composition and % of defoliation.

3197. KIRST, G., and STAUDER, F. Auftreten und Bekämpfung des *Ennomis quercinaria* Hfn. in den Forstämtern Fischbach (Saar) und Saarbrücken (1952-54). [Occurrence and control of *E. quercinaria* in the forest districts of Fischbach and Saarbrücken (1952-54).] *Forstwiss. Cbl.* 73 (9/10), 1954 (271-5). 1 ref. [G.]

Brief notes on the pest, the outbreaks, and their control by spraying with DDT.

3198. KLEMENT, Z. [Experiments on the use of bacteria in biological control of *Hyphantria cunea* Drury.] *Mezőgazdasági kísérletiügyi központ évkönyvéből* [Hungary] 3, 1951 (118-27). [Hu.-russ.f.]

From abstr. in *Z. PflKrankh.* 62 (1), 1955 (31). [G.] E.M.B.

In laboratory experiments, *Beauveria bassiana* gave an 80-90% and *Bacillus thuringiensis* a 100% kill. Equally good results were obtained by spraying Mulberry leaves with a spore suspension of the latter, larvae dying in 2-13 days, according to age. The pathological symptoms are described. In outdoor experiments all larvae on *Morus alba* were killed and on Apple nearly all those in the 3rd-5th stadia.

3199. KLEMENT, Z. [Further experiments on the use of *Bacillus thuringiensis* for biological control of *Hyphantria cunea* Drury.] *Jahrbuch ungar. Forschungsinst. Pflanzenschutz* 6, 1951 (1953) (177-83). [Hu.russ.e.] From abstr. in *Z. PflKrankh.* (1), 1955 (32). [G.] E.M.B.

Further experiments on the concentrations necessary.

3200. TEMPLIN, E. Erkennung und Bekämpfung der Kiefernsaateule, *Agrotis vestigialis* Rott. [Recognition and control of *A. vestigialis*.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutztier. Schäd.)* No. 3 (2nd ed.) 1953. pp. 13. 2 refs. [G.]

3201. KRUEL, W. Über die wissenschaftlich-technische Zusammenarbeit im land- und forstwirtschaftlichen Pflanzenschutz. [Co-operation between theory and practice in agricultural and forest plant protection.] *NachrBl. dtsh. PflSchDienst.* 8 (11), 1954 (201-6). [G.]

A discussion with special reference to problems presented by *Euproctis chrysorrhoea*.

3202. ESTERBERG, L. K. Aviacionno-himičeskaja borjba s šelkoprijdom-monašenkoj v sosnovykh lesah. [Aerial dusting for the control of *Lymantria monacha* in Pine forests.] *Lesn. Hoz.* 5 (5), 1952 (82-3). [Russ.]

In 1949 *L. monacha* appeared on some 2400 ha. of the Gorokhovets and Balakhnin forests, chiefly in Scots Pine stands of quality classes II-III, 40-60 years old and of low density. As abundant egg laying (2500 eggs/tree) pointed to the possibility of an outbreak, aerial dusting was decided on and Na fluosilicate (15 kg./ha.) was applied from 23 May, 1951, 1602 ha. of Gorokhovets being treated in 7 days and 378 ha. of Balakhnin in 3 days. It is noted that light rain, so far from diminishing the toxicity of the dust, actually raised it. The dust remained on the trees for 6-7 days, and the kill of *L. monacha* was 84.2%. Of the total kill recorded, *L. monacha* made up 70.7%, and only 4.1% represented useful insects; a very few useful small birds also died. Under one group of young Pine were found two specimens of *Xyela julii*, a pest whose life history is not yet known.

The author notes a peculiarity not hitherto recorded, viz. that the larvae began to ascend into the crown only when they had been warmed by sunlight. A cold spell in May of this year prevented the larvae from reaching and feeding in the crowns, so that when it became warm again, many were so weakened by starvation that they could not reach the foliage. This peculiarity explains why stands of low density and groups of isolated trees suffer the worst attack. Observations also showed that for a

considerable period of its life *L. monacha* does not feed on needles at all. First- and second-instar larvae on young Pine fed only on the May shoots; on adult trees they fed on the ♂ flowers until shortly before the 4th instar, when feeding on the needles began. The erect habit of the May shoots and ♂ flowers makes for good coverage by the insecticide and explains the efficacy of the aerial dusting.

3203. KALANDRA, A., KUDLER, J., and KOLUBAJTIV, S. Letecké a pozemní poprašování v boji proti mniškově kalamitě v ČSR v. r. 1947-1949. [Dusting from aircraft and from the ground in the control of the 1947-49 mass outbreak of *Lymantria monacha* in Czechoslovakia.] *Práce výzkum. Úst. lesn. ČSR* No. 5, 1954 (45-109). 59 refs. [Cz.russ.g.]

Describes control measures taken in the spring of 1949. The campaign was prepared in advance on the basis of the topographical distribution of the 1948 attack, and the swarming and egg-laying as well as the health condition of the different development stages of the pest. Although its natural mortality was high, reaching in some foci 50%, once it reached new stands it spread vigorously. Parasites took some toll, but neither fungi nor polyhedral disease could be observed. The ♂s were usually more numerous than ♀s, and the ♀ pupae were large. Laboratory tests showed that young instars of larvae were very sensitive to Gesarol, which killed them within 1-3 days; 40 kg./ha. of 5% Gesarol gave best results. Two types of specially adapted aircraft were used for dusting operations: a two-engine plane of 600 kg. dust capacity, and a single engine one of 200 kg. capacity to be used in hilly districts. The operation involved 13 heavier and 8 lighter aircraft, and began in 3 different places between 16 and 20 May, lasting until 9 June. The time chosen was 5-8 a.m. and 5-8 p.m., dusting rate 30-50 kg./ha. Motor-operated ground dusters were used in places missed by aircraft. Larval mortality averaged 93%. It was found later than the *L. monacha* outbreak was checked in 1949 in the most formidable foci, and 1950 saw the beginning of decline.

3204. TEMPLIN, E. Auftreten des Eichenprozessionsspinners und Vorschläge zu seiner Bekämpfung. [*Thaumetopoea processionea* outbreaks and suggested control measures.] *Wald* 2 (4), 1952 (124-6). 5 refs. [G.]

An account, in general terms, of places affected in E. Germany, damage done, and life history of the pest. Suggested control measures include dusting with DDT as soon as feeding has started, spraying poison rings on the stems for protection, and destruction of the 'nests' immediately after pupation, particularly on park or roadside trees to prevent inconvenience from the irritant hairs.

3205. TEMPLIN, E. Goldafter (*Nygmia phaeorrhoea* Don.) und Eichenprozessionsspinner (*Thaumetopoea processionea* L.). [*N. phaeorrhoea* and *T. processionea*.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutztier. Schäd.)* No. 7, 1953. pp. 10 + 13 photos + 1 map. 3 refs. [G.]

Their distribution, biology, importance, recognition and control.

Coleoptera

See also Nos. 2632, 3012, 3087.

3206. KOVAČEVIĆ, Ž. Čempresov krasnik, *Buprestis cupressi* Germar, štetnik čempresa i cedra na jadranskom primorju. [*B. cupressi*, a pest of Cypress and Cedar on the Adriatic coast.] *Šum. List* 78 (11/12), 1954 (587-92). [Croat.]

In Yugoslavia this pest attacks *Cupressus sempervirens* (both varieties), *Cedrus deodora*, *C. libani* and *C. atlantica*, and seems also to attack *Juniperus macrocarpa* and *Thuja orientalis*. The only method of control is the removal of the infested stems.

3207. KRUEL, W. Der blaue Kiefernprachtkäfer (*Phaenops cyanea* F.). [*P. cyanea*.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutz tier. Schädl.)* No. 13, 1954. pp. 6 + 8 photos. [G.]

Recognition, biology, and nature and control of damage.

3208. JAMNICKÝ, J. Krasec *Phaenops cyanea* F., kalamitný škodca v Polsku. [*P. cyanea*, a serious pest in Poland.] *Les, Bratislava* 1 (12), 1954 (18-21). [Slovak.]

The post-war outbreak of this pest in Poland lasted ca. 5 years and involved more than $\frac{1}{2}$ of Polish 100-year-old Pine stands. The generation cycle was 1-2 years. Describes the use of trap-trees for controlling the pest. Towards the end of the mass outbreak, the larvae showed a considerable mortality due to nematodes.

3209. SCHNAIDEROWA, J. O zwalczaniu stoniek występujących na topolach. [Control of Chrysomelidae found on Poplars.] *Sylwan* 98 (4), 1954 (316-21). 12 refs. [Pol.pol.]

Presents tabulated results of: (1) laboratory tests on the insecticidal effect of Sandotex, 8% BHC, 10% DDT, Na_2SiF_6 , and Arsopul on imagos of *Melasma populi* and *Phyllodecta vitellinae*; (2) field trials on the effect of the same insecticides on insects (not specified) at all development stages, in a 10-year-old *Populus robusta* stand; (3) effect of DDT, BHC and Arsopul on the length of 1-year shoots, diam. of the root collar and leaf dimensions, of *P. robusta*. It was found that the imagos and larvae of the two species are sensitive to insecticides, particularly contact ones. Since the insecticides used do not kill eggs and pupae, it was necessary to repeat the dusting at least 3 times at 3-week intervals; the best time to start dusting is late in April or early in May (when the imagos after hibernation attack the young leaves). About 4-5 kg./ha. of insecticide suffice for a 1-year-old Poplar plantation. DDT and Sandotex were found to give the highest kills, while DDT and Arsopul had the best effect on plant growth; results are tabulated.

3210. TURČEK, F. J. Mechanický spôsob znižovania stavu osikovníka drsného na topoloch. [Mechanical method of reducing infestation of Poplars by *Saperda carcharias*.] *Les, Bratislava* 1 (11), 1954 (19-21). 3 refs. [Slovak.]

In March, 1954, the author plugged with concrete the existing ["pre-bored"] exit-holes in 26 seven-year-old Poplar stems in a plantation at Gabčíkovo (Slovakia), where ca. 65% of the stems were attacked by *S. carcharias* in 1953. The first check (in June)

was inconclusive, probably because swarming had not yet begun; but in August, 10 stems were felled and the plugged galleries and pupal chambers were found to contain either dead or motionless imagos or pupae; the unplugged galleries from the higher portions of these stems contained only live larvae.

3211. TEMPLIN, E. Überwachung und Abwehr des kleinen Pappelbocks. [Control of and protection against *Saperda populnea*.] *Merkbl. Inst. Forstwiss. Eberswalde (Abt. Forstschutz tier. Schädl.)* No. 14, 1954. pp. 11 + 11 photos + 1 map. 9 refs. [G.]

Importance, bionomy and control.

3212. ANDERS, O. Rüsselkäferfrass an *Tsuga heterophylla*. [Weevil attack on *T. heterophylla*.] *Anz. Schädlingsk.* 28 (2), 1955 (24). [G.]

T. heterophylla planted with Douglas Fir under Pine was attacked by *Brachyderes incanus* and *Strophosomus rufipes*. The Pine and Douglas remained untouched.

3213. MIRZOJAN, S. A. K faune koroedov (Coleoptera, Ipidae) listvennyh drevesnyh porod Armjanskoi SSR. [Notes on the barkbeetle fauna of deciduous tree species in Armenia.] *Izv. Akad. Nauk armjansk. SSR (biol. sel.-hoz. Nauki)* 7 (7), 1954 (59-70). 18 refs. [Russ.arm.] N.C.L.

Notes on distribution, host species, damage done etc., compiled from the author's own observations and from literature, and covering 39 species, including many first records for Armenia.

3214. WRIGHT, E., and WRIGHT, K. H. Deterioration of beetle-killed Douglas Fir timber in Oregon and Washington: a summary of findings to date. *Res. Pap. Pacif. Northwest. For. Range Exp. Sta.* No. 10, 1954. pp. 12.

The following main results have emerged from preliminary analysis of research data of 1952-53 on damage by *Dendroctonus pseudotsugae*: (1) Volume loss from decay is faster in young trees because of the greater proportion of sapwood. (2) Higher recovery can be obtained if the wood is salvaged for pulp rather than for lumber. (3) After 2 years, the sapwood has generally deteriorated so as to be unsuitable for lumber, but even after 3 years some sapwood may be recovered for pulp. (4) By the 4th year decay begins to penetrate the heartwood and by the 6th, 25-50% of tree volume will be lost. (5) After sapwood deterioration, breakage in felling is much greater than in green timber. (6) Progress of wood-boring insects for at least 6-7 years is directly related to decay. (7) Rate of deterioration appears to be directly related to intensity of beetle attack.

3215. SMITH, R. H. Benzene hexachloride controls black turpentine beetle. *Sth. Lumberm.* 189 (2369), 1954 (155-7).

Of 8 materials tested, 0.5% γ BHC in diesel oil was most effective in preventing attack on freshly felled Slash Pine stumps and on standing trees. To control existing attacks, $\text{C}_6\text{H}_5\text{Br}_2$ should be added to this solution at 3 lb./5 gal. The sprays should be applied at 1 gal./40-50 sq. ft. of bark surface, loose bark and debris being removed from the stump.

3216. JONES, G. D., and FORD, J. E. Ips engraver beetle. Extension Folder, North Carolina State College of Agriculture and Engineering, Raleigh No. 108, 1954. pp. 6. P.R.

Deals with the life cycle, damage, prevention and control of *Ips avulsus*, *I. grandicollis* and *I. calligraphus*.

3217. KOLUBAJIV, S., and KALANDRA, A. Přírodní nepřátelé lýkožrouta smrkového *Ips typographus* L., zjištěni v kalamitním období 1940 až 1952 v Československu. [Natural enemies of *I. typographus*, observed in Czechoslovakia during its mass outbreak in 1940-52.] *Práce výzkum. Úst. lesn. ČSR* No. 5, 1954 (27-44). 60 refs. [Cz.cz.russ.g.]

Eighteen parasitic and 19 predatory insect species have been identified. The most effective are: *Thanasimus formicarius*, *Rhopalicus tutela*, *Pachyceras xylophagorum*, *Dendrosoter middendorfi*, *Lonchea seitneri* and *Medetara signaticornis*.

3218. Serious Silver Fir [*Abies amabilis*] beetle damage reported in Washington. *J. For.* 52 (12), 1954 (961).

[Cf. *For. Abstr.* 12 (No. 1601).] The area affected by *Pseudohylesinus* spp. is now over half a million acres. Concerted research on control and the reorientation of logging plans to minimize losses is being undertaken by all forest agencies.

3219. BURRAGE, R. H., and GYRISCO, G. G. Distribution of third instar larvae of the European chafer and the efficiency of various sampling units for estimating their populations. *J. econ. Ent.* 47 (6), 1954 (1009-14). 5 refs.

[Cf. *For. Abstr.* 16 (No. 2003).] Counts of third instars (the easiest stage to sample) from foot-square units within permanent pasture sod plots, 25 × 25 ft., showed a tendency to clumping, with more high and low counts than would be the case in a random distribution. In each plot examined, distributions approximated more nearly to negative binomial than Poisson series. By comparing the total areas that had to be sampled with each unit to give a population estimate of the same precision, it is shown that the foot-square unit was statistically about twice as efficient as the 4-ft.-square unit and 3-4 times as efficient as the 9-ft.-square unit. In practice, the greater time taken in sampling with smaller units reduces these margins.

3220. TASHIRO, H., and WHITE, R. T. Milky diseases of European chafer larvae. *J. econ. Ent.* 47 (6), 1954 (1087-92). 7 refs.

Laboratory and field inoculation tests are described, and it is concluded that there is promise of obtaining economic control of *Amphimallon majalis* with highly pathogenic strains of *Bacillus popilliae* and *B. lentimorbus*.

3221. GYÖRFI, J. A cserebogár-kerdés jelenlegi helyzete. [The cockchafer problem to-day.] *Erdő* 3 (1/2), 1954 (24-33). [Hu.]

The intermingling of the three main biological races of cockchafer in Hungary, composed of *Melolontha melolontha* and *M. hippocastani* with 3- and 4-year life cycles respectively, results in an annual swarming in some districts e.g. in the S.W. and N.E. parts of the country. Although a warm,

dry season favours larval development, observations of various soils supporting a more or less dense vegetal cover contradict views on the destructive effect of frost and groundwater on larvae, and indicate that the latter may colonize shaded soils and damage old forest stands in heavily infested areas. Biological control of the larvae by species of Tiphidae and Scoliidae may be promoted by planting *Daucus carota*, *Pastinaca sativa*, *Sambucus nigra*, *Heracleum*, *Polygonum*, *Solanum*, *Echium* and *Euphorbia* round nurseries. The usefulness of the wild boar in controlling cockchafer in forests is stressed. Tests with Agritox [BHC preparation of Hungarian manufacture] on different soils, including sands, showed optimum kills at 200-300 kg./ha. 1% γBHC, preferably ploughed under to 20-25 cm. depth, but also when applied in suspension in holes. Since first-year larvae are the most susceptible to treatment and BHC persists in the soil for about 2 years, it is advisable to apply the chemical during early spring of the swarming year or in the previous autumn. *Larix decidua* seedlings were stimulated by treatments and suffered no damage by concentrations of up to 6 g./sq. m. crude BHC. Cockchafer control in forest stands is at present limited by technical difficulties and the use of chemicals may unfavourably affect the biological balance of their insect fauna.

3222. RICHTER, G. Beitrag zur Engerlingsbekämpfung mit chemischen Mitteln auf Kiefern-kulturen und in Kämpfen. [Chemical control of cockchafer grubs in Scots Pine plantations and nurseries.] *Wald* 2 (4), 1952 (105-9). [G.g.]

Describes the use of insecticides based on BHC and/or DDT, and results of tests carried out near Potsdam in spring 1951, before planting out 2-year-old transplant stock, by treatment of (a) strips and (b) planting notches, stating insecticides tried, dosage, and plants dead by September. For (a) Arbitan soil-dusting powder, which had the highest γBHC % and gave the best results, a table shows recommended dosages and width of dusted strip in relation to strip spacing and larval stages present. No phytotoxic effects were observed during the first growing season at a maximum dosage of 6 kg./are. DDT preparations failed completely, [thiophosphoric-acid?] ester preparations partially. For (b) only Silvexan (BHC) was used (2-4 g. per planting notch), which gave good protection. The author discusses the respective uses of the above two methods and that of root dusting [cf. *For. Abstr.* 15 (No. 2705)] and deals briefly with the treatment of nurseries and existing plantations.

3223. RUDNEV, D. F., and GRIMALJSKIĖ, V. I. Toksičnostj geksahlorana kak fumiganta dlja ličnok hruščei. [The toxicity of BHC as a fumigant for chafer grubs.] *Dokl. Akad. Nauk SSSR* 97 (3), 1954 (551-4). 5 refs. [Russ.] A.P.B.

Dusting the roots of planting stock with BHC has caused some checking of growth on dry soils, especially in the south of Russia, and in droughts has led to death of the plants. In view of this, preliminary experiments were made on the possible use of BHC as a fumigant, i.e. avoiding direct application to the roots. Chafer grubs were placed in

5 × 5 × 5 cm. wire cages filled with earth from the experimental areas, with a piece of potato for food, and the cages were let into the soil at varying distances from a 5- or 10-g. dose of 12% BHC dust. In summer 1951, in sandy, dry Pine-forest soil 25 cm. N. of Kiev, the test larvae used were *Anoxia pilosa* and *Polyphylla fulva*. Cages were inspected every 10 days, dead grubs being removed and replaced with living ones and a fresh dose of BHC inserted. Surface soil temperatures reached 56°, but no systematic temperature readings were taken. There was no striking difference in effect between the two dosages used. With the BHC buried at 10 cm. depth, mortality in the adjacent cages was 61–71% and some effect was detectable even at 30 cm. distant from the BHC; with the BHC at 40 cm. depth, however, the effect even in the adjacent cages was much less. As this difference was thought to be connected with soil temperature, similar experiments were made in 1952 with 2-year grubs of *Melolontha melolontha*: (a) in shaded interspaces between the lines of a 3-year-old Norway Maple plantation, with (12%) BHC [dosage not stated] at 25 cm. depth; (b) among 1-year Pine seedlings in open nursery ground, with BHC at 5 cm. depth; and (c) ditto, with BHC at 25 cm. depth. The mean and maximum temperatures at the level where the BHC was inserted were respectively: (a) 19.1°, 20.3°; (b) 25.1°, 31.1°; (c) 18.7°, 21.2° C. In the 10–13 days of the test no toxic action was observed in (a) or (c), and in (b) only the grubs in the nearest and second nearest cages, i.e. up to 10 cm. distant, were killed. Results suggested that a mean soil temperature of ≥ 25° is necessary for effective action of BHC as a fumigant. A laboratory experiment in autumn of the same year, conducted under thermostatic control (dosage 5 g. 12% BHC dust) showed that the lethal effect extended at 25° no more than 5 cm., at 30° to 10 cm. (with some effect at 20 cm. since grubs at 10–20 cm. distant stopped feeding), and at 35° to 20 cm.

3224. LEBEDEVA, L. Himičeskaja bor'ba s žukami maiškogo hrušča. [Chemical control of adults of *Melolontha melolontha*.] *Lesn. Hoz.* 5 (5), 1952 (79–81). [Russ.]

Dusting from the air (6–16 May 1950) of poorly stocked stands of Scots Pine with some Aspen and Birch in the Buzuluk region, using 5.5% DDT at 15, and 12% BHC at 20 kg./ha. gave kills of 78% and 80% respectively and reduced egg-laying to 40% of that in untreated sites. In 1950, 12-year-old Pine stands with scattered Birch in Voronezh Province, were found to be dying back and infested with chafer (74 pupae/sq. m.). These were also dusted from the air in May 1951 with (a) [10%?] DDT at 15 kg./ha. and 12% BHC at (b) 15 or (c) 30 kg./ha. In areas dusted with (c) only a few individual chafers were seen flying, while in neighbouring areas dusted with (b) some slight swarming in the crowns was noted. Dusting also greatly reduced egg-laying: (c) by nearly 95%, (b) by more than 80%, and (a) by about 92%. It was noted that (b) gave inferior results to 10% DDT applied at the same rate. Since BHC is easily blown away by the wind and loses its toxicity under the action of sunlight, a rate of 20 kg./ha. is recommended. Dusting should

begin on the 4th or 5th day after mass swarming has started, should be completed in 5–6 days, and needs to be repeated in each swarming year. Swarming starts at temperatures of ca. 18° C., which coincide with the flushing of Aspen.

Tests were made in 1950 in the Buzuluk forest of DDT and BHC at 20, 40, 80, 150 and 300 kg./ha. hand-dusted on litter in 100-sq. m. plots, divided by trenches one spit wide and one deep, in pure Pine and Pine/Poplar stands (planted 1935) badly damaged by chafer grubs; results showed that < 150 kg. 12% BHC/ha. was ineffective, and > 150 kg./ha. excessive. On emerging, the chafers remained near their holes and beat their wings, thus apparently transferring dust from the litter on to themselves, after which they were unable to fly, picked up still more dust from the litter, and perished in 1 or 2 days. Dusting with BHC at 80 kg./ha. did not prevent the chafers from taking wing after emergence. DDT gave poor results for all rates used.

3225. KUČINSKIĀ, A. F. Ustoičivost' kul'tur barhata amurskogo protiv ličinek maiškogo hrušča. [Immunity of *Phellodendron amurense* plantations from attack by grubs of *Melolontha melolontha*.] *Lesn. Hoz.* 5 (5), 1952 (93). [Russ.]

A month after planting, 98% survival was recorded for 2-year transplants of *P. amurense* on a 9-year-old felling site, badly infested with *M. melolontha*, in the Lenin Experimental Forest of the Belorussian Forest Research Institute; mortality by the end of Sept. was 4%, attributed entirely to drought. In the arboretum of the same Institute, a 4-year-old *P. amurense* plantation had only 1–2 grubs/sq. m., though at a distance of 1–2 m. in an adjoining field there were 10–12 grubs/sq. m.

Hymenoptera

See also Nos. 2633–4.

3226. KALANDRA, A. Ploskohrbetka smrková a boj proti ní. [*Cephalcia abietis* and its control.] *Lesn. Knihovna (malá řada)* No. 14, 1952. pp. 28 + [1]. [Cz.] Price Kčs.12.

Describes the biology, outbreaks, prevention and control of this pest.

3227. GALOUX, A. La pullulation du lophyre roux (*Neodiprion sertifer* Geoffr.) dans la région spadoise (1948–1950). [The outbreak of *N. sertifer* in the Spa district, 1948–50.] *Trav. Sta. Rech. Groenendaal (Sér. C)* No. 16, 1952. pp. 31. 16 refs. [F.]

Analyses statistically the rise, climax and decline of the outbreak on the basis of samples taken at the time.

3228. BRENY, R. *Neodiprion sertifer* Geoffr.: l'oeuf et le végétal. [*N. sertifer*, the egg and the plant.] *Bull. Inst. agron. Gembloux* 22 (3/4), 1954 (179–88). 4 refs. [Flem.e.g.] E.M.B.

Discusses the relationship between the egg and the tissue of the needle into which it is inserted, and the possibility of forecasting larval emergence by phenological characteristics of the host and neighbouring trees of other species. Observations are presented on emergence of *N. sertifer* on Pine of

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varying ages and on different sites, and some phenological characteristics are suggested by which time of larval emergence can be determined.

3229. TURNOCK, W. J. **Tamarack killed by the Larch sawfly.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (6), 1954 (2).

Continued defoliation of *Larix laricina* by *Pristiphora erichsonii* affects the tree in the following sequence: (1) lower branches die, shoot production and needle length reduced; (2) upper branches die back to trunk, foliage produced on adventitious shoots; (3) tree dies.

3230. LEJEUNE, R. R., FELL, W. H., and BURBRIDGE, D. P. **The effect of flooding on development and survival of the Larch sawfly, *Pristiphora erichsonii* (Tenthredinidae).** *Ecology* 36 (1), 1955 (63-70). 6 refs.

A fuller account of investigations already published elsewhere. [Cf. *For. Abstr.* 12 (No. 214).]

3231. LEJEUNE, R. R., and HILDAHL, V. A survey of parasites of the Larch sawfly (*Pristiphora erichsonii* (Hartig)) in Manitoba and Saskatchewan. *Repr. from Canad. Ent.* 86 (8), 1954 (337-45). 8 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 140.)

The parasite complex in the Prairie region consists of 3 principal species, *Bessa harveyi*, *Mesoleius tenthredinis* and *Tritaneptis klugii*. The defoliation history of Larch was studied in a number of representative stands in which parasitization by *B. harveyi* and *M. tenthredinis* was observed. Only *B. harveyi* seems to exert any appreciable control. *M. tenthredinis* contributes little because of the immunity reaction of the host population, and *T. klugii* appears sporadically and unpredictably. Other important biological control factors also exist but their influence is not substantial. In Manitoba and Saskatchewan, where the immunity has practically nullified control by *M. tenthredinis*, infestations are very persistent, and it is suggested that the present outbreaks in central Canada and Minnesota are caused by a resistant strain of sawfly that has spread from an area of origin, probably located in Manitoba.

3232. REEKS, W. A. **An outbreak of the Larch sawfly (*Pristiphora erichsonii* (Htg.)) (Hymenoptera Tenthredinidae) in the Maritime Provinces and the role of parasites in its control.** *Repr. from Canad. Ent.* 86 (10), 1954 (471-80). 8 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 162.)

Observations drawn during the 1933-42 outbreak, mainly from rearing or dissecting field-collected larvae and cocoons. The records show with reasonable certainty that the end of the outbreak was hastened by *Mesoleius tenthredinis*.

3233. BENSON, R. B. **Another new sawfly (Hym. Tenthredinidae) on Larch in Britain.** *ent. mon. Mag.* 90 (1080), 1954 (113-4).

A description of *Pristiphora glauca* sp. nov., similar to *P. wesmaeli*, but distinguished in morphology and biology. The latter is summarized here; a fuller account will issue later from the research staff of the Forest Commission.

3234. HUSSEY, N. W. **Revised descriptions of three *Megastigmus* species (Hym. Torymidae) associated with seeds of Silver Fir.** *Ent. mon. Mag.* 90 (1085), 1954 (223-5). 1 ref.

These revisions of 3 European species are given to facilitate determinations and to complete on a common system with Milliron [see *For. Abstr.* 11 (No. 941)] the descriptions of the known *Megastigmus* fauna of *Abies* seed. A table shows for each of the 9 species of *Megastigmus* the distribution and the host trees (12 spp.).

Diptera

3235. RODRIGUEZ, J. G. **Control of some Boxwood pests.** *Amer. Nurseryman* 101 (5), 1955 (11).

Organic phosphates—parathion, malathion and demeton (Systox)—sprayed on to infested shrubs of *Buxus* sp. in May, successfully controlled both *Monarthropalpus buxi* and *Simplinychus buxi*. Malathion (1 pint/50 gal. water) is recommended because of its relatively low toxicity to in mammals.

459. Other Animals

See also No. 3235.

3236. SEYMOUR, W. **Another forest pest?** *Quart. J. For.* 49 (1), 1955 (59).

Damage was done to 2-year-old plantations of *Robinia pseudoacacia* by small snails (*Helicella* sp.) gnawing the surface layer of bark. The trees were completely ringed in various places from the bottom of the stem to the tips of the branches. The cambium was intact, and it is hoped that the trees will recover. Application of 'Slug Death' at the base of the trees put an end to the infestation. Other species in the plantations (young Beech, Ash, and Sycamore Maple) were not touched.

3237. SCHUDER, D. L. **The Maple bladder gall and its control.** *Arborist's News, Wooster* 18 (4), 1953 (29-31). L.S.

Describes galls caused by the mite *Vasates quadripes* on *Acer saccharinum* and their control. If liquid or dry lime/sulphur cannot be used because of the danger of staining buildings etc., good control can be obtained with any one of the following: in 100 gal. water, 2 lb. 15% parathion wettable powder, 4 pints 48% Systox, 8 pints 30% potasan or 6-7 pints malathion, used as a spray in early April, just before flushing.

46. DAMAGE TO TREE GROWTH BY MAN

See No. 3055.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

See also Nos. 2657, 3014, 3125.

3238. STOATE, T. N., and BEDNALL, B. H. **Later disorders in Pine stands in South and Western Australia.** *Leaf. For. Timb. Bur. Aust.* No. 66, 1953. pp. 14 + 11 photos. 13 refs.

Describes two types of disorder: 'death wilt' and 'rapid decline', occurring in *Pinus pinaster* and *P. radiata* on a number of different soils, the causes and cure of which are unknown.

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3239. WELLINGTON, W. G. Pole blight and climate. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (6), 1954 (2-4).

A climatological survey (1930-50) has been carried out in British Columbia, Washington, Idaho, and parts of Montana, in connexion with studies of pole blight of *Pinus monticola*. The main points established are: (1) precipitation deficiencies have been more frequent in pole-blight areas than in those free from pole blight; (2) an even stronger association is shown between high temperatures and pole blight; and (3) the strongest association occurs between decreased precipitation coupled with increased temperature, and pole blight. The implications of these results are discussed.

3240. BALDWIN, H. I. Needle blight in Eastern White Pine [*Pinus strobus*]. *Plant Dis. Repr.* 38 (10), 1954 (725-7). 16 refs. A.P.B.

[Cf. *For. Abstr.* 15 (No. 1620).] A history of the

disease and results of a survey in New Hampshire. Observations substantiate the conclusions reached by earlier investigators that the blight is related to deficient root action resulting from drought injury.

3241. Thinning and weeding in relation to disease incidence. *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (13-5).

[Cf. *For. Abstr.* 15 (No. 1626).] Total mortality, gummosis and wood rot in plots of *Acacia decurrens* var. *mollissima* were less in unweeded compared with hand-pulled or hoed plots. Gummosis occurs more with free-growing vigorous trees, and considering good growth and health together, the best thinning was to thin to 3 ft. apart in the 6-ft. rows when 6 in. high, then reduce the densities to 1200, 700 and 500/acre when stems were 6, 15 and 35 ft. high respectively, the last probably being feasible at 25 ft. without increasing disease.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

51. SYSTEMS AND UNITS OF MEASUREMENT

3242. LÜNZMANN, K. Masse und Gewichte. 3. Holzmasse. [Measures and weights. 3. Wood measures.] *Holz Roh- u. Werkstoff* 12 (12), 1954 (483-4). 11 refs. [G.] P.R.

Contains definitions and tables of different cubic measures of wood.

3243. ALBES, Die Homa ohne Raummeter. [The 'Homa' [German rules for measuring wood] without the stacked cu.m.] *Wald* 2 (1), 1952 (8-11). [G.]

Suggests that stacked wood assortments should be made up in stacks whose dimensions would not be the stacked cu.m. but, by the use of simple conversion factors, would give an actual content of one solid cu.m. This would greatly simplify accountancy.

3244. LANDBECK, H. 'Die Homa ohne Raummeter'. [The 'Homa' without the stacked cu.m.] *Wald* 2 (3), 1952 (76-7). [G.]

Discusses the article by Albes and suggests extension of the principle of a single unit of measurement, the solid cu.m. u.b., for all management records.

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

3245. DANILOV, V. N. Osobennosti taksacii saksaulovyh lesov Srednei Azii. [Method of measuring *Haloxylon* woods in Central Asia.] *Lesn. Hoz.* 5 (5), 1952 (59-60). [Russ.]

The shrubby growth form of *Haloxylon* spp. makes ordinary methods impracticable. According to Alfeev's method, age is ascertained by counting the rings along the radius on which their number is highest and dividing the total by 10 for quality class I, 6 for II and 3 for III. Heights are easy, as growth rarely exceeds 6 m. Diameters are taken at ground level. In the absence of yield tables, stocking is expressed in terms of a single standard density

(1.0 = 1000 stems/ha.). Quality class is determined by height together with growth habit, depth of water table and geographical location (within the range of influence of the Amu- and Syr-Darya rivers; semi-desert; desert). In aerial surveys, only 3 age classes are recorded (up to 10 years; 10-20 years; 20 years and over), distinguishable by shape of the bushes and the occurrence of bent-over stems, a peculiarity linked with age. Neither heights nor species can be determined from the air. Mean height is therefore estimated from quality and age class; *H. persicum* is assumed to occupy the more broken terrain and deep sandy soils, and *H. aphyllum* the easier terrain and light solonchak soils.

3246. YOSHIDA, M., and HIRATA, T. [Some statistical studies on stand composition of artificially planted forests. (V).] *Bull. Tokyo Univ. For.* No. 46, 1954 (115-43). [Jap.]

Detailed analysis of the constitution of stands of *Cryptomeria japonica* and *Quercus* spp., including the relationships between d.b.h./stem volume, stem vol./total ht.; total ht./d.b.h., crown breadth/d.b.h., crown breadth/total ht.; form quotient/d.b.h., stem spacing/d.b.h., stem spacing/total ht.

521. Diameter (Girth) and Sectional Area

3247. HOLLERWÖGER, F. Is there a correlation in the Teak forests between crown diameter and the height of the trees with regard to the diameter at breast height? *Journal of Scientific Research in Indonesia, Djakarta* 3 (1), 1954 (3-20). 22 refs. [E.] L.S.

Results of a survey (both aerial and ground) made in a Teak area in Ledok, Central Java, show that in mature Teak forest there exists no direct relation between crown diameter and stem diameter. This is due to the fact that Teak reaches its maximum crown diameter at an age when d.b.h. is still steadily increasing, and, in old trees, crowns may become smaller, whereas d.b.h. may still increase. In measurements made in a young plantation, however,

a slight correlation was found between crown diameter and d.b.h. No correlation exists between length of bole and d.b.h. either in mature forest or in plantations, and only a slight correlation exists in plantations between d.b.h. and total height of trees.

522. Height, Length

See No. 3247.

3248. PARDÉ, J. Un dendromètre pratique et efficace: le dendromètre Blume-Leiss. [A practical and efficient hypsometer: the Blume-Leiss.] *Rev. for. franç.* 7 (3), 1955 (207-10 + 2 photos). [F.]

Describes the design and use of this German-made hypsometer, which has been employed for some time at the Research Station at Nancy. Experience there indicates a total error of ca. 1%. [Cf. *For. Abstr.* 15 (Nos. 1630-1).]

524. Determination of the Volume of Trees and Stands

524.1. Principles of Volume Determination. Form (Taper)

3249. MATSUI, Z., BABA, K., and ANAZAWA, H. [On the b.h. form factor of Todo Fir and Ezo Spruce.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (169-73). [Jap.e.]

Based on 4070 stems of *Abies mayriana* and *Picea jezoensis*, the following correlations between form factor (f), height (h), and diam. class (d) are given:

$$f = 0.271 + \frac{4.863}{h} - 0.312 e^{-0.25 h}$$

$$f = 0.311 + \frac{7.90}{d} - 0.19 e^{-0.1165 d}$$

Results of the use of these formulae are compared with data from the volume table in current use. *From authors' summary.*

3250. MATSUI, Z., BABA, K., and ANAZAWA, H. [The relationship of the form factor and form quotient of conifers.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (174-8). 7 refs. [Jap.e.]

For Todo Fir [*Abies mayriana*] and Ezo Spruce [*Picea jezoensis*] in the Furenai district the relation between the b.h. form factor (f) and the absolute form quotient (q) is $f = q - 0.232$. For classes with [mean] d.b.h. (cm.)/[mean] height (m.) of 40/21 and 50/26 this relation is $f = 0.65q^2 + 0.152$. For the group 40/15-29, $f = 0.652q^2 + 0.151$ and for 50/18-33 m., $f = 0.669q^2 + 0.142$.

3251. ROZENBERG, V. A. Ob'emnye tablicy dlja taksacii molodyh drevestoev. [Volume tables for young stands.] *Lesn. Hoz.* 5 (6), 1952 (70-2). [Russ.]

Presents volume tables for *Quercus mongolica*, *Betula dahurica*, *Aspen* [*Populus tremula*?], *Tilia amurensis*, *T. mandshurica*, and *Phellodendron amurense* for stems up to 10 cm. d.b.h. (by 1-cm. gradations) and 8 m. in height (by 2-m. classes) compiled for the tree/shrub thickets of the southern part of the Maritime Province (Soviet Far East), and based on periodic measurement and stem analyses of 13-15 *Q. mongolica*, 9-11 *B. dahurica*, and 7-8 trees each of the other species per diam. gradation.

524.3. Volume of Tree Groups and Stands

3252. GEVORKIANTZ, S. R., and OLSEN, L. P. Composite volume tables for timber and their application in the Lake States. *Tech. Bull. U.S. Dep. Agric.* No. 1104, 1955. pp. 51.

This report explains the development of a set of composite volume tables for the Lake States and their application in the field. Six tables have been prepared, that can be adjusted by means of correction factors to fit any particular stand. They have been tested extensively in the field and have been found satisfactory in replacement of the numerous local species volume tables formerly used in the Lake States.

3253. Standard volume table for *Eucalyptus obliqua* second growth from southern forests. Tasmanian Forestry Commission, Hobart. 1953. pp. 91.

3254. A földi fotogrammetria erdőgazdasági alkalmazása. [The use of ground photogrammetry in forestry.] *Erdő 3* (4), 1954 (114-25). [Hu.]

A technique using stereo pairs of good photographs for the determination of timber volume is described. In trapezoid fields delineated by the angle of vision of the camera and by a parallax line corresponding to the depth of focus, the d.b.h. of each wholly visible stem is measured by means of an optical micrometer device which gives a direct reading of the actual diameter and of the area of the selected visual field. The volume of an average stem is then calculated [method?] and multiplied by the number of trees, including those that are partially visible on either of the two photographs. If necessary, tree species may be differentiated by marking before taking the photographs and tree heights established from curves based on a number of field measurements and volume tables used for estimates. Since wholly invisible trees on a properly focused photograph do not usually exceed 10%, estimates obtained on a representative site by using suitable focal depths agree fairly closely with those made by direct measurements in the field. The method is claimed to have the advantage of requiring less field work, permitting a repetition of estimates at any time and providing permanent pictorial documentation useful in evaluating the progress of silvicultural measures on the site.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

3255. SPURR, S. H. Simplified computation of volume and growth. *J. For.* 52 (12), 1954 (914-22). 5 refs.

The author illustrates, with worked examples, short-cut methods of computing enumeration data with fully automatic calculating machines, thus reducing the work of a day to a few minutes. The theory of volume and growth estimation is that of the author's 'Forest Inventory' [see *For. Abstr.* 14 (No. 525)]. The use of cubic-foot measure, the volume-line method, and the two-way method of growth prediction are particularly recommended for simplicity, accuracy and adaptability to fast calculating machines. *From author's summary.*

3256. FINNEY, D. J. The estimation of error in the systematic sampling of forests. *Journal of the Indian Society of Agricultural Statistics, New Delhi* 5 (1), 1953 (6-16). 5 refs. H.S.B.

De Lury has proposed to assess the precision of estimates based upon systematic samples of forests by fitting polynomials to the component items of the sample and using the deviations from a polynomial equation to provide a variance per sample strip. This method has now been tried, for many different intensities of sampling, on two extensive enumerations of Indian forests.

For both forests, the estimates of mean volume are in general fairly close to the true values known from full enumeration. The standard errors (S.Es.) calculated according to De Lury's formulae, however, completely fail to indicate which estimates are near and which far from the truth. Moreover, the variances per strip do not show any agreement with systematic sampling variances calculated in a previous study of the whole evidence from the forests; indeed, one forest is known to show a periodicity, yet no indications of this appear when De Lury's method of analysis is applied.

Most investigations of the precision of systematic samples, including the earlier ones on these two forests, relate to a sampling procedure in which the first strip is chosen at random [cf. *For. Abstr.* 10 (No. 2313)]. De Lury's method relates to a symmetrically located sample which will not necessarily have the same precision. A comprehensive empirical study of this matter would require comparison of types of sampling and assessments of S.Es. for many different forests, and not merely for different sampling intensities of one or two forests. Conceivably the S.Es. reported in this paper, as calculated from De Lury's formulae, do properly reflect the precision of the estimates to which they are attached. Their complete irregularity, and the lack of any trends similar to those known to be correct for sampling with a random first strip, suggest that the basic assumptions of De Lury's method are not satisfied in practice. Unless the trend of variation in the whole of a forest can usually be represented adequately by a polynomial equation, the fitting of such an equation to sample values may be totally inappropriate and the assessment of S.E. irrelevant and useless.

In an earlier comment on De Lury's book, the author expressed the opinion that a polynomial was unlikely to give a good representation of variation in a forest. The two forest enumerations studied support this view, but more sets of data need to be examined before his interesting proposals are discarded as unsatisfactory. Nothing that has been said is to be taken as suggesting faults in De Lury's mathematical theory, which is undoubtedly correct; doubts arise only in relation to the question of whether the natural variation in a forest can be described by the mathematical model he discusses. *Author's summary.*

3257. RICHTER, A.; GROSSMAN, H.; THIELE, H. Beiträge zur Methodik der Holzvorratsinventuren auf mathematisch-statistischer Grundlage. [Statistically-based enumeration methods.] *Arch. Forstw.* 2

(2/3; 4/5; 6), 1953 (142-81; 289-339; 481-501). 50 refs. [G.]

Chap. 1 sketches the development in Germany of 'management for the benefit of the growing stock', which advocates *inter alia*, mixed uneven-aged stands, explaining also the need for new methods of determining growing-stock volume that should give information on stand structure by species, diameter, and stem and crown quality classes, and (by successive enumerations) on increment. Statistical sampling is advocated and the basic theory of the required statistics outlined in Chap. 2. Chap. 3 describes the 215-ha. research forest at Eberswalde (Scots Pine/Beech/Hornbeam) and the results, illustrated by many tables, of the experimental enumerations made in it of the kind outlined by Richter [see *For. Abstr.* 15 (No. 2773)]. To provide the basis of comparison, every stem ≥ 7 cm. diam. was calipered and recorded for stem and crown quality. In the sample enumeration, circular-plot centres were pricked on a map to give one plot per $\frac{1}{4}$ ha. Round each centre, trees $\geq 7, 10$ and 25 cm. diam. were enumerated in concentric circles of respectively $\frac{1}{4}, 1$ and 4 ares. The volumes of the 834 plots obtained are stated on a per-ha. basis, in the order of their occurrence on the ground, and these figures are used in the subsequent statistical examination. The differences in results between full enumeration and systematic sampling at densities of one plot per $\frac{1}{4}, \frac{1}{2}$ and 1 ha. etc., and for increasing extent of area sampled, are then discussed, the total volumes, volumes by diam. classes, species, stem and crown qualities, being in turn the chief measures used. The effect of doubling plot size, and the sampling error of 3 crews measuring the same compartment (important in successive enumerations for determining increment), are also shown. The random method was tested by drawing for 417 out of the possible 834 plots, and the stratified random method by drawing for half the number of plots available in each compartment. The results confirm Eckert's conclusion that systematic sampling is best for Central European conditions. The stratified random method was second and pure randomization worst. An analysis of variance is made, without blocks and with blocks consisting of stand types. A graph shows the coefficient of variation at plot densities of one per $\frac{1}{4}$ ha. to one per 20 ha. To calculate this coefficient, 30-40 plots suffice. With one plot per $\frac{1}{4}$ ha., volume comparisons were accurate enough at the 5-ha. level, but 30-40 ha. were required to show volumes by species, diameter, and stem or crown quality classes, and multiples of the latter were necessary to show by species and diameter classes the structure of the whole forest. The size of plot requires further investigation. The calculated error of sampling is about one-quarter greater than the actual error based on complete enumeration. This system is recommended as applicable to the enumeration of parcels of forest and country-wide inventories and as lending itself to punched-card analysis. Chapter 4, by a mathematician of the Berlin Academy of Science, compares the actual with the statistical error obtained by considering the 215 ha. as divided into 5375 four-are plots from which a 15.52% sample of 534 plots (one per ha.) is

drawn. The plot volume frequencies (stated on a per ha. basis) show 3 peaks, corresponding to at least 2, and probably 3 populations (young, medium-aged, and old timber). When these are plotted separately by species and diameter classes, normal distributions are shown in Pine and Beech, the chief components. A table compares for Pine, Beech, and 'other species', in 5 diameter classes, the range of the statistical error and the actual error based on full enumeration. A discussion follows on the need for other groupings e.g. site classes and stand types, and on appropriate formulae for calculating error. A table shows the range of error derived from 3 of these formulae (including variance analysis) for Pine, Beech and 'other species' and the whole population compared with that of full enumeration.

525. *Volume by Assortments. Merchantable Volume*

See also Nos. 3214, 3291.

3258. WILCOX, E. R. Adaptation and use of a form class slide rule for estimating log diameters in standing trees. *J. For.* 53 (1), 1955 (26-7). 1 ref.

Describes a 6-in rule, developed for Ponderosa Pine, graduated to show in Scribner Decimal C the volumes of 16-foot logs in a tree of given d.b.h. growing in a stand of given form class.

526. *Log Measurement. Scaling*

3259. HEISKANEN, V. Paperipuunkorjen mittauksen tarkkuudesta Perä-Pohjolassa. [The accuracy of measurements of pulpwood stems in North Finland.] *Acta for. fenn.* 61 (18), 1954. pp. 13. 15 refs. [Fie.]

Examines the accuracy of volume tables for top measurement of pulpwood, and of top measurement in general in N. Finland. The amount of taper in both Spruce and Pine varies greatly, but in a big parcel of pulpwood the difference between real volume and volume estimated from top diameter is generally < 12%, and for more than $\frac{1}{3}$ of the stock < 4%. The difference in taper of stems from publicly owned and private forests is also examined.

527. *Solid Volume of Stacked Products*

See also Nos. 3243-4.

3260. ARO, P. Über die Ursachen der Massunterschiede beim Ausfuhrpapierholz. [The cause of differences in estimation of volume of pulpwood for export.] *Acta for. fenn.* 61 (7), 1954. pp. 20. [G.f.]

Describes the different methods of stacking and measuring pulpwood in Finland and Germany, and the discrepancies resulting therefrom, and presents a conversion factor for rectifying them.

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See Nos. 2620, 2659, 2735, 3005, 3245, 3248 3269.

54. ASSESSMENT OF SITE QUALITY

See also Nos. 2646, 2747, 2802, 3000, 3245.

3261. YOUNG, H. E. Forest soils—site index

studies in Maine. *Proc. Soil Sci. Soc. Amer.* 18 (1), 1954 (85-7). 11 refs. O.R.E.

Presents the results of studies made in Maine on White Pine and Spruce/Fir stands using the methods of Coile. [Cf. *For. Abstr.* 1 (p. 26); 10 (No. 1499).]

3262. GINDL, J. [Mean height as an indicator to the quality of Aleppo Pine forests.] *Hayaar* No. 4, 1955 (45-9, vi). [Heb.e.]

Calculation of mean height of *Pinus halepensis* showed that where proper treatment and density are maintained, the curve is stable and characteristic of the species. The shape of the curve reflects its light-demanding character. The mean-height curve is diagnostic for the site quality, density, age, and degree of normality of the stand.

3263. REGINSTER, P. La productivité stationelle des hêtraies d'Ardenne. [Site quality of Beech woods in the Ardennes.] *Bull. Soc. for. Belg.* 62 (1), 1955 (1-8 + 3 photos). [F.]

Comparison of 3 floristic variants of *Fagetum*: (a) *Deschampsia flexuosa*, (b) *Luzula nemorosa*, and (c) *Festuca silvatica* shows that (c) indicates the highest site quality, followed by (b) and then by (a). There are indications that the *Asperula* type may represent a higher site quality than any of these.

55. AGE DETERMINATION

See Nos. 3245, 3273.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 2620, 2725, 2729-30, 2818, 2849-52, 2856-7, 2861, 2873, 3000, 3003 *et seq.*

3264. SCHLETTNER, A. Betrachtungen zur Weck-schen Methode der Wachstumsdiagnose. [Weck's method of growth analysis.] *Arch. Forstw.* 3 (3/4), 1954 (193-205). 8 refs. [G.]

A constructive criticism of part of Weck's application of Backman's growth law, to the correct development of which the author attaches great practical importance [cf. *For. Abstr.* 14 (Nos. 1420-1)]. The sources of error that require reduction lie in the determination of (a) end values of growth series, and (b) the year in which c.a.i. culminates, and in (c) the fact that the value attached by Backman to (b), viz. $x = -\sqrt{\frac{1}{2}}$, is only an approximation. Examples are illustrated, on logarithmic paper, from Spruce yield tables (height growth), the stem analysis of a 145-year-old Spruce (height, diam., b.a., volume growth) and the height growth of two species of Poplar. The formula has applications in plant breeding. [Cf. *For. Abstr.* 16 (Nos. 1420, 1599).]

3265. WORTHINGTON, N. The Loblolly Pine of the south versus the Douglas Fir of Pacific Northwest. *Repr. from Pulp and Paper, Seattle*, Sept., 1954. pp. 4.

Compares the growth and yield of the two species, in natural unmanaged forest, on average forest and site conditions of the two regions, and gives tables (from yield tables and forest survey data) showing the higher yield/acre by cord and by bd. ft. for Douglas.

3266. LIU, S.-H. [Studies on the growth of some important coniferous trees in A-Li-Shan.] *Bull.*

Taiwan For. Res. Inst. No. 34, 1952. pp. 42. 18 refs. [Chin.e.]

Three average-grown trees each of (1) *Cryptomeria japonica*, (2) *Chamaecyparis taiwanensis* (up to 20 years, planted), (3) *C. formosensis* and (4) *Taiwania cryptomerioides* (up to 75 years, natural stands) were stem-analysed and the mean data tabulated, graphed and discussed. (1), the exotic, was the fastest grower, (2) also fast, (3) and (4) slow. At 75 years, the c.a.i. of (3) had not yet culminated; the c.a.i. of (4) had culminated, but not its m.a.i. Details of local soil and climate are given.

3267. LIU, S.-H., and YANG, P.-L. [Studies on the increment of four introduced species in Heng-Chun.] Bull. Taiwan For. Res. Inst. No. 30, 1952. pp. 33. 13 refs. [Chin.e.]

Four exotics, *Garcinia spicata* (2 stems), *Swietenia mahagoni* (3 stems), *Cassia siamea* (3 stems) and *Agathis alba* (1 stem), between 28 and 42 years old and of average growth were analysed and the mean data tabulated, graphed and discussed. *G. spicata* grew slowest but promises well as a windbreak species in Taiwan and Heng-chun. All four species are well suited to the locality.

3268. LIU, S.-H., and YANG, P.-L. [Studies on the growth of indigenous species in Heng-Chun.] Bull. Taiwan For. Res. Inst. No. 35, 1952. pp. 38. 11 refs. [Chin.e.]

Three stems each of the indigenous species *Diospyros utilis*, *Palaquium formosanum*, *Terminalia catappa*, *Calophyllum inophyllum* and *Pistacia chinensis* were analysed and the mean data, up to 32 years, tabulated, graphed, and discussed. *T. catappa* grew fastest and *C. inophyllum* slowest. Tables and graphs have English legends.

3269. MITSCHERLICH, G. Der Einfluss der Bestandesdichte auf den Zuwachs der Rotbuche in Nord- und Westdeutschland. [The influence of stand density upon increment of *Fagus sylvatica* in northern and western Germany.] Forstwiss. Cbl. 73 (7/8), 1954 (193-211). 32 refs. [G.g.]

Presents a study of previously published data in order to discover whether optimum basal areas exist for stands of *F. sylvatica*. It is concluded that (1) optimum b.a. increment is obtained by maintaining ca. 20 sq.m./ha. in young, and 25-28 in older stands, and (2) optimum volume increment is obtained by maintaining 28-30 sq.m./ha. in young, and 30-35 in older stands. From author's summary.

561. Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology

See also Nos. 2996, 3003, 3037.

3270. KUROIWA, K. [Diameter growth of the stems of *Paulownia* girdled with band [dendrometer].] J. Jap. For. Soc. 36 (11), 1954 (313-7). 5 refs. [Jap.e.]

Diameter growth of *P. tomentosa* was studied from daily readings between early March and late October of a band dendrometer of Japanese make, fixed on 2 trees, and compared with Reineke's Precision Dendrometer, fixed on a single tree. Growth began from about the end of March,

showed two maxima (beginning of June and mid-July), slowed down abruptly at the end of July, and ended by mid-October. Maximum daily growth in girth was 0.39 mm. from 6 to 13 June. The band dendrometer showed itself to be insensitive compared with the Precision Dendrometer, chiefly through the pressure exerted on the bark by its spring-loaded band.

3271. STUDHALTER, R. A. Tree growth: I. Some historical chapters. Bot. Rev. 21 (1/3), 1955 (1-72). 12 pp. of refs. [Texas Technological College, Lubbock.]

A historical review of the development of ideas on tree growth from ancient Greek times onward, with special reference to the bud-root theory, tip growth, growth layers, multiple tip and diam. growth, growth in the tropics, root growth, causes of growth, internal markers and cross-dating.

3272. GLOCK, W. S. Tree growth: II. Growth rings and climate. Bot. Rev. 21 (1/3), 1955 (73-188). 13 pp. of refs. [Tree-Ring Research Laboratory, Macalester College, St. Paul, Minn.]

A critical review supplementary to, and on a broader basis than, its predecessor [cf. For. Abstr. 3 (p. 350)], with the object of tracing major developments rather than attempting to cover all relevant articles. The section heads are: growth and growth factors (site, anatomical, physiological); growth record in trees; growth and climate; and growth rings as a tool.

3273. DUTTON, H. A. The age of a 1000 year old Fig tree. Trees, Cleveland, Ohio 14 (4), 1954 (10).

A ring count on a *Ficus* sp., in Mexico, known to have been planted about 80 years ago, showed roughly 1000 growth rings. The possible danger of tree-ring dating in archaeology using this and similar species is emphasized.

562. Volume Increment

3274. BOROWSKI, M. Nowa metoda oznaczania bieżącego przyrostu męszności drzewostanu. [A new method of determining the current volume increment of stands.] Sylwan 98 (4), 1954 (257-78). 6 refs. [Pol.pol.russ.]

The accuracy of the method, based on determination of the volume increment of a large number of felled sample trees [see For. Abstr. 15 (No. 1660)], varies as the square root of their number. To increase this number considerably is impracticable on both theoretical and practical grounds; on the other hand, with a relatively small number, one is likely to get randomized 'volume' sample trees rather than 'increment' sample trees. The author sought a close correlation between volume increment and d.b.h. increment, determining the latter by increment borer for a relatively large number of 'auxiliary' sample trees. The volume increment of the stand is calculated from the formula

$$W = G \times \Sigma w_i / \Sigma g_i,$$

where G is the b.a. of the stand, Σw_i , the sum of volume increments of the sample trees, and Σg_i , the total b.a. of the sample trees. The quotient $\Sigma w_i / \Sigma g_i = i$ is called by the author the mean 'volume increment intensity'; it varies directly as the height,

form factor and d.b.h. increment, and inversely as d.b.h. A high degree of correlation was found to exist between i and d.b.h. increment, the relationship being a linear one for each diameter class. The method suggested starts by enumerating the whole stand by d.b.h. classes. The d.b.h. increment for the period in question is then determined from several dozens of ('auxiliary') trees of different diameter classes, using the increment borer; a d.b.h. increment curve is then drawn. Next, 'increment' sample trees are chosen proportionally from all diameter classes, care being taken that these trees have a d.b.h. increment typical of their diameter class. After felling, the volume increment of these sample trees is determined by stem analyses, and the stand volume increment is calculated from the formula referred to above. The author used this method for determining the 10-year increment of a Pine stand felled in 1948 (523 trees, mean age 80 years, site quality I, area 1.5 ha.) [cf. *For. Abstr.* 14 (No. 3583)]. The diameters were divided into 2-cm. classes. The d.b.h. increment curve was obtained from 52 randomly chosen 'auxiliary' sample trees, and the volume and b.a. increments were then determined for 10 sample trees of different diameter classes, with d.b.h. increments typical of each class. When 30 randomly taken sets of such representative sample trees were taken as a basis for determining the volume increment of the stand, the mean error (compared with the 'true' volume increment) was $\pm 2.6\%$ (maximum positive and negative errors being $+6.83\%$ and -4.06% , respectively). Results obtained without using the smoothed d.b.h. increment curve had a mean error of $\pm 4.89\%$.

3275. HUMMEL, F. C. Analysis of increment cores. *Tech. Pamphl. For. Dep. Cyprus* No. 15, 1954. pp. 5 + 3 tbls. (Extract from a report 'Proposals on some aspects of forest management in Cyprus' prepared for publication by A. Polycarpou.)

The method is based on that described by Loetsch [see *For. Abstr.* 15 (No. 564)] but using girth, instead of diameter, classes and b.h. measurements. The various steps are described and illustrated by an example from a medium-aged *Pinus halepensis* var. *brutia* forest in Ayia range, Paphos forest.

565. Sample-Plot Technique

3276. STAEBLER, G. R. Standard computations for permanent sample plots as recommended by the Puget Sound Research Center Advisory Committee for use in Western Washington. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. 1954. pp. 14 + 1. 8 refs.

The 13 steps described are, in order, (1) preparation of stand table, (2) preparation of local volume table, (3) preparation of stock table (from (1) and (2)), (4) and (5) determining average diameter (total and partial stand), (6) determining average height, (7) determining stand age, (8) determining site index, (9) determining p.a.i., (10) determining periodic annual mortality, (11) determining mean net annual increment, (12) determining relation of stand to normal and (13) preparing a summary sheet of data.

566. Yield Tables and Their Construction

See also No. 2857.

3277. MATSUI, Z., and ONODERA, S. [On the growth of the secondary Kashiwa-Oak windbreak forest in Tokachi district.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (191-5). [Jap.e.]

Gives a yield table with supporting data for the coppice stands in Mikage Mura of *Quercus dentata*, 10-40 years old. The m.a.i. is 2.8 cu.m./ha., about one-half that of Larch.

3278. ERTEL, W. Ertragstafelauszüge für den Gebrauch in der Praxis auf der Grundlage des Schwappach-Wiedemannschen Ertragstafelwerkes. [Extracts from yield tables for use in practice, based on yield tables by Schwappach and Wiedemann.] Neumann Verlag, Radebeul. 1953. pp. 62. [G.] Price DM 4 (7s. 6d.).

Species covered are Beech, Oak, Alder, Ash, Birch, Norway Spruce, Scots Pine, Larch, Douglas Fir, *Abies alba*, *Robinia pseudoacacia* and *Quercus borealis*.

3279. MATSUI, Z., and SHINOHARA, H. [On the growth of Sugi plantation near its northern limit of growth.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (162-8). 3 refs. [Jap.e.]

Works out, with supporting data, yield tables for 2 site classes, showing intermediate and final yields between 5 and 50 years for *Cryptomeria japonica* growing between 43 and 44.4° N. lat. Mean annual increment in cu.m./ha. on these sites at 40 years is 20.3 and 12.8 respectively, and the mean heights of stands 19.3 and 16 m.

3280. MATSUI, Z., and MORI, K. [On the growth of the [Japanese] Larch plantations in Kushiro district.] *Spec. Rep. For. Exp. Sta., Hokkaido* No. 2, 1954 (179-90). [Jap.e.]

Six quality classes are distinguished by stand height at 15 years (8-13 m.) and m.a.i. (5-10 cu.m./ha.). Seven yield tables for 5- to 30-year-old stands representative of this range are worked out with supporting data and 7 plantations are allocated to their quality classes. The inferior sites are windswept and coastal, the superior are inland, with less fog, higher air temperature and softer winds.

568. Other Mensurational Studies of Stand Constitution and Changes Therein.

Distribution of Growth by Tree Classes etc.

See also Nos. 2829, 3284.

3281. CARLSON, J. A. R. Några observationer över höjd- och diameter-utvecklingens beroende av åldern i tallbestånd. [Some observations on the dependence of height and diameter development on age in Scots Pine stands.] *Norrlands SkogsvFörb. Tidskr.* 1954 (4), (499-506). [Sw.]

Observations were made on diameter and age at breast height and on height of dominant and subdominant trees from 6 sample plots that had been thinned heavily from below on site class V in N. and Central Sweden. Ages at the first of 3-6 inspections ranged between the plots from 51 to 70, and at the last, from 71 to 99 years. In the 3 N. Swedish plots (87-99 years at the last inspection) height increased with age to a certain point and then

levelled off, while on the other 3 plots (71 years at the final inspection) height increased throughout. On all plots diameter increased steadily with age. A closer study of dominant trees on the Central Swedish plots confirmed the general results, and showed that the later-established trees were getting up into the crown layer. As the experiment was made on only a small amount of material, results (given in graphs and tables) can be considered only provisional and local. General conclusions include the following: differences in height, but not in diameter, between trees of different ages, tend to level out with increasing age; and it is more important in thinning, to ensure even spacing than to ensure even height.

58. SURVEYING AND MAPPING. AERIAL SURVEYS

See also No. 2793.

3282. Tarım Vekalîti Orman Umum Müdürlüğü Teknik Çalışmalarından harita ve amenajman işleri. [Mapping and management operations of the

Turkish Forest Service.] T. C. Tarım Bakanlığı (Vekaleti) Orman Genel (Umum) Müdürlüğü, Ankara. 1954. pp. 66 + 1 map. [Turk.]

A semi-popular, well illustrated booklet explaining current work and its objects, with some forest statistics, and a map (1 : 2,000,000) showing the main forest areas, and their condition.

3283. GALOUX, A., and REGINSTER, P. Cartographie écologique et forestière du Domaine Provincial de Mirwart (Ardenne belge). [Ecological and forest mapping of the provincial forest of Mirwart, Belgian Ardennes.] *Trav. Sta. Rech. Groenendaal (Sér. A)* No. 9, 1954. pp. 19 + 4 maps. [F.]

Describes the cartographical methods used, and gives extracts from 4 maps: (1) the existing forest types, (2) forest associations, (3) soils, (4) details of stand composition.

585/588. Aerial Reconnaissance and Survey

See Nos. 2724, 3245, 3248.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

See also No. 3282.

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also Nos. 3007, 3636.

3284. LENGIER, A. À propos d'une loi mathématique simple concernant la structure équilibrée des peuplements forestiers. [A simple mathematical law concerning the constitution of forest stands.] *Bull. Inst. agron. Gembloux* 22 (3/4), 1954 (241-54). 6 refs. [F.] E.M.B.

An exposition of the mathematical basis of the work of H. A. Meyer [see *For. Abstr.* 13 (No. 4123).]

3285. ROUSSEL, L. Matériel et production. [Growing stock and yield in a Silver Fir forest of the Jura.] *Rev. for. franç.* 7 (2), 1955 (121-9 + 1 map + 1 photo + 4 gphs.). [F.]

Analyses the growing stock and yield of the forest of Levier, and concludes that such a forest, in a state of equilibrium, can sustain a growing stock of ca. 500 cu.m./ha. Higher figures may be possible in some compartments, but a lower figure will result in a smaller yield and inferior quality of wood.

3286. LEMPS, F. DE. Économies réalisables au chapitre de l'entretien des lignes dans les forêts feuillues. [Possible economies in the upkeep of compartment boundary lines in hardwood forests.] *Rev. for. franç.* 7 (3), 1955 (201-6). [F.]

Discusses the expense involved in the upkeep of lines between compartments, felling series etc., especially in coppice-with-standards, and shows from two examples (illustrated with diagrams) how the length of line can be reduced by alterations in lay-out, e.g. by avoiding long, narrow compartments.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also Nos. 2818, 3284-5.

3287. LEROY, R. La prévision du volume des coupes dans les futaies jardinées. [Assessing the volume to be felled in selection forest.] *Rev. for. franç.* 7 (2), 1955 (108-20). [F.]

It is argued that the proportion of volume marked to growing stock in selection Fir [*Abies alba*] forest may be evaluated as a % by the addition of 4 coefficients; (1) 'coefficient of capital' taking into account vol./ha. and ratio of trees of ≥ 45 cm. d.b.h. to those of 20-40 cm. d.b.h.; (2) 'coefficient of health' and (3) 'coefficient of regeneration', both based on empirical scales representing divergences from the norm for the region; and (4) 'coefficient of treatment', a corrective term that permits the consideration of particular factors such as the protective rôle of the stands, risks of windthrow, local modifications of merchantable diameter, abnormal rotations etc. The calculation and application of these coefficients is illustrated from an example in the Pyrenees.

3288. LANDBECK, H. Die Revierkartei. [Card catalogue for forest district management records.] *Wald* 2 (6), 1952 (182-6). [G.]

Suggests, with sample, a form of card suitable for recording all relevant particulars at sub-compartment level. [Cf. *For. Abstr.* 14 (No. 1452).]

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 2965, 3007, 3671, 3679.

3289. BARREDA, J. A. Finanzas y valuación forestal. [The economics and valuation of forests.] *Agronomía, Lima* 18 (75), [1954?] (103-12). [Span.] C.G.B.

Deals in fairly general terms with the calculation of costs and income from forest stands, including the valuation of ornamental trees.

3290. CHAPMAN, G. L., and BAKER, G. Planned thinning in a stand can pay a double profit. *Maine Farm Research, Orono, Maine* 2 (3), 1954 (6-8).

Tabulated figures are given showing the logging and milling costs, lumber value and net income (\$37.77/1000 bd. ft. for all log sizes lumped) in thinning a 45-year-old stand of White Pine by removing the poorest-quality trees and those of merchantable size not expected to live another decade.

3291. SALO, E. Puiden teknillinen vikaisuus ja sen vaikutus puuston arvoon. [Technical defects of trees and their effects upon timber values.] *Acta for. fenn.* 61 (24), 1954. pp. 20. 11 refs. [Fie.]

An investigation was made into the validity of the reduction % for standing timber defects allowed when valuing land for resettlement after the war. These had been based mainly on ocular estimates. The importance of assessing cull separately for each species, and determining the proportion of each species in the stand is emphasized. Tables (with data on % defect and reduction in value for different assortments of Scots Pine, Norway Spruce and Birch), have legends in English and Finnish.

3292. THOMSON, H. A. R. The valuation of timber for estate duty. *J. Land Agents' Soc.* 54 (3), 1955 (132-8).

3293. ABETZ, K. Die Herleitung des Steuerwerts des Waldes in der deutschen Bundesrepublik. [Ascertaining the taxable value of forests in Western Germany.] *Acta for. fenn.* 61 (26), 1954. pp. 12 [G.]

3294. KELTIKANGAS, V. Metsäpalkan pinta-alan vaikutuksesta sen kauppahintaan. [The effect of area upon the value of a forest holding.] *Acta for. fenn.* 61 (37), 1954. pp. 12. 7 refs. [Fie.]

The usual method of pricing forests is to assess separately the value of the land, of sawtimber and of small wood and add them together. In fact, however, prices paid per ha. are much greater for small woodlots than for large forests. Different ways of taking this factor of size into account when valuing forest land, are discussed.

3295. JACOB, G. R. Growing and felling policy, [for the U.K.]. *Timb. Tr. J.* 212 (4091), 1955 (87-9, 101).

A paper read at the Imperial Forestry Institute, Oxford, and reproduced in full, recommends for home-grown production of softwoods, close-grown plantations clear felled to yield a mid-diam. of 8-12 in. (sawlogs 6-16 in.) and lengths nearer the imported 10-12 ft. rather than the local 4-9 ft. Such a policy would justify the modernization of mills for high-speed softwood sawing.

66. COSTING OF LOGGING OPERATIONS

See also No. 3015.

3296. HUTSON, H. P. W. Forest roads: their

economic justification. *Forestry* 28 (1), 1955 (7-16).

Three tables are given showing: (1) the limiting figure for profitable expenditure on a road network, for a range of conditions, based on the reduction of the length of off-the-road haul from $\frac{1}{2}$ mile to 150 yards; (2) the effect of the provision of roads on the investment yield; (3) roadwork costs/mile and costs/acre. Using these tables, two typical examples are worked out: one from the point where thinning begins, the other for the entire life of the forest. From author's summary.

3297. VANSLYKE, A. L. Research project No. 5. Effect of volume per acre on cutting and skidding costs. *For. Res. Note Causapsca For. Res. Sta. No.* 5, 1955. pp. 3 + gph.

The investigation was made in stands with overstorey of Spruce, and understorey of dense Balsam Fir reproduction, and was based on the production of 4-ft. Spruce-pulpwood per crew-day, all members of the crew being paid the same daily wage, no power saws used, and skidding by horses. The trend was towards increased production at higher volumes of Spruce per acre. Statistical analyses of the results led to the regression equation.

$$Y = 1.264 \log X + 1.77$$

when Y = production rate in cords/crew-day and X = number of cords cut from 2 acres. Values calculated from the equation (adjusted to vol/acre) are tabulated for volumes/acre of 0.5, 2.5, 5, 7.5, 10, 12.5, 15, 17.5 and 20 cords of 125 cu. ft. The use of these figures for determining the economic feasibility of cutting in stands within this volume range is explained.

67. ASSESSMENT OF FINANCIAL RESULTS; BOOK-KEEPING AND ACCOUNTANCY; BUSINESS STATISTICS; SHORT-TERM PLANNING AND FINANCING

See also No. 3691.

3298. CHAPPUIS, J.-B. La comptabilité commerciale de l'entreprise forestière. [Commercial accountancy for the forest business.] *Mitt. schweiz. Anst. forstl. Versuchsw.* 31 (1), 1954 (153-237). 42 refs. [F.f.g.]

Gives detailed figures for two forest enterprises, describes and discusses commercial methods of accounting and analysis and how far they are applicable to forest enterprises in general and to these enterprises in particular, and indicates the deficiencies in the data usually available for such enterprises.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

See also Nos. 3632, 3706.

681. National (Federal, State) Forest Services and Administration

3299. [The [United States] Forest Service's first fifty years.] *J. For.* 53 (2), 1955 (99-135).

An article by the Chief of the Forest Service (R. E. McArdle) reviews the past activities of the Service and looks forward to a 2- or 3-fold increase in production, an extension of fire protection and an

improvement in multiple-use yields. This article is followed by three by the assistant chiefs for national forest administration, State and private forestry, and research (V. L. Harper; E. P. Cliff; W. S. Swingle) on the activities of their respective divisions. A forest consultant (G. L. Drake) giving a personal, but probably generally accepted, industrial view, suggests that greater attention should be given to, and more timber should be supplied by, the national forests, in which road development should be taken up. These forests maintain balance in the switch-over from old-growth to 2nd-growth management. Pest and disease control requires more money. The trend towards centralization at Wash-

ington should be reversed. More basic research in management and product development is required. Other articles deal with small woodlands and the public services (E. W. Littlefield), pest and disease control (J. A. Beal and L. M. Hutchins), and co-operation between federal and state services (G. O. White).

3300. ENTICKNAP, A. G. The N.S.W. Forestry Commission works and activities 1954-55. *Aust. Timb. J.* 20 (11), 1954 (825...828).

Finance and general planning by the New South Wales Forestry Commission for the year 1954-55 and beyond.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 3670, 3709.

71. MARKETING OF FOREST PRODUCTS: GENERAL

3301. Timber wholesale trade. Census of distribution 1950 findings—sales—gross margins—stocks—transport costs. *Timb. Tr. J.* 212 (4091), 1955 (85-6). 1 ref.

Abstract from the Census of distribution report for Great Britain for 1950.

3302. Cooperage competition grows. *Timber of Canada* 15 (6), 1955 (38-9, 42). 1 ref.

Notes from the Stanford report on U.S. conditions for cooperage, with additional information on those in Canada.

72. THE QUANTITATIVE ASPECTS OF MARKETING.

DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 3459, 3671, 3678, 3709.

3303. PÖNTYNE, V. Tutkimuksia suomen teollisuuden vuonna 1950 käyttämistä polttoaineista. [Investigations into industrial fuel in Finland in 1950.] *Acta for. fenn.* 61 (1), 1954. pp. 26. 13 refs. [Fie.]

A study of the different kinds of fuel used (i.e. wood, peat, coal and coke) and the relative quantities of imported and home produced fuel.

3304. VUJIĆ, L. Proizvodnja, potrošnja, etat i potrebe janskog drveta u FNRJ. [Production, consumption, annual cut, and demand for, mining timber in Yugoslavia.] *Šumarstvo* 7 (9/10), 1954 (536-45). 12 refs. [Serb.e.g.]

Data are tabulated of production and consumption of pitprops in 1947-53 and the prospective demand for 1954-63. Since the demand cannot be covered from regular cuttings and thinnings, other measures are suggested, in the first place the growing of *Robinia pseudoacacia* and *Poplars* with rotations of 20-30 and 15-20 years, respectively.

3305. America's demand for wood 1929-1975: summary of a report by Stanford Research Institute to Weyerhaeuser Timber Company. Weyerhaeuser Timber Co., Tacoma, Washington. 1954. pp. 95.

73. PRICES

See No. 3671.

78. ECONOMICS OF TRANSPORT

See also Nos. 3078-9.

3306. LINDFORS, J. Sahatukien kaukokuljetuksen eräitä piirteitä. [Some features of the transport of sawtimber in Finland.] *Acta for. fenn.* 61 (22), 1954. pp. 12. [Fig.]

Gives some statistics of quantities transported respectively by road, rail, and water.

3307. El tarifado ferroviario de la madera. [Railway freight rates for timber.] *Chile maderero* 4 (7), 1954 (5...9). [Span.]

Freight rates for timber (both converted and in the rough) have recently been revised in Chile [cf. *For. Abstr.* 15 (No. 1695)], and are discussed.

3308. Assembly Interim Committee on Transportation and Commerce: Problems of log hauling: Report to the Legislature pursuant to House Resolution No. 232—1951. Assembly of the State of California, Sacramento, Calif. 1953. pp. 48.

The report is directed to a study of the extent of highway damage by log haulers, and the unique problems of the logging industry as affected by the overweight penalty law.

79. ECONOMICS OF THE WOOD INDUSTRIES

See also Nos. 3537, 3544, 3557-8, 3615.

3309. The pulp and paper industry in Europe: development and prospects. Organisation for European Economic Co-operation, Paris. 1954. pp. 86. Price 8s. 6d.

3310. PELLEGRINI, A. L'industria della carta in Italia secondo il censimento 5 Novembre 1951. [The pulp and paper industry in Italy according to the census of 5 Nov. 1951.] *Pubbl. Ente naz. Cellulosa Carta, Roma*. 1954. pp. 146 + 18 tpls. [It.]

3311. New peaks posted in pulp and paper production. *Pulp Paper Mag. Can.* 55 (13), 1955 (78-87). 1 ref.

Draws on the 1953 report of the Forestry Section, Industry and Merchandising Division, Dominion Bureau of Statistics, to show in 11 tables a detailed analysis of the industry and in 3 graphs the development of pulp, paper and newsprint production.

MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

Of the 10 leading industries in 1952, Canadian production of pulp and paper ranked first in both gross and net value and in salaries and wages paid; in employment it held second place. Sawmilling ranked in the corresponding categories as 6, 4, 2, 1, but part of the employment in sawmilling covered the preparation of pulpwood.

3312. KEMP, C. D. The paper industry in the Australian economy. *Aust. Timb. J.* 20 (12), 1955 (942...957, 983).

A paper presented at the 7th General Conference of the Australian Pulp and Paper Industry Technical Association, 1953, covering capital invested, annual production, employment, research expenditure, competitive imports, use per head and general place in trade.

3313. Report on the wooden case industry of Victoria. *Aust. Timb. J.* 20 (11), 1954 (879...888).

Covers timber consumed, factors affecting usage, competition with substitute containers, usage according to commodities packed and types of mill production.

3314. The wooden case industry of Queensland. *Aust. Timb. J.* 20 (12), 1955 (912...919). 1 ref.

2nd interim report by the Division of Imports, Exports, Statistics and Programming of the Forestry and Timber Bureau, Melbourne, giving the same type of information as that referred to in the preceding abstract.

3315. MARSHALL, E. D. Standard accounting forms for Texas sawmills. *Tech. Rep. Tex. For. Serv.* No. 5, 1952. pp. 19.

8. FOREST PRODUCTS AND THEIR UTILIZATION

3316. ASTM standards on wood, wood preservatives, and related materials. Specifications, methods of testing, definitions and terms. American Society for Testing Materials, Philadelphia. 1954. pp. 353. P.R.

3317. MAYER-WEGELIN, H. Produktion und Verwertung der Rotbuche. [Production and utilization of Beech wood [in Germany].] *Schweiz. Z. Forstw.* 105 (12), 1954 (687-96). [G.f.]

Describes its principal uses in Germany in the past and subsequent changes. Three-quarters of the value of the tree is contained in the butt log (ca. $\frac{3}{10}$ of total height) which is suitable for veneer. The upper logs are used mostly for sleepers.

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

810. General Information on Woods

See also Nos. 2702, 2725, 2729-30, 2732-3.

3318. Nomenclatura de las principales maderas de coníferas españolas. [Nomenclature of the principal woods of Spanish coniferous species.] *Norma española, Instituto Nacional de Racionalización del Trabajo, Madrid* No. UNE 41037, [1952?]. pp. 3. [Span.] P.R.

A proposed standard giving (1) official commercial name, (2) other commercial names, (3) scientific name, and (4) notes on the quality and uses of the wood.

3319. Nomenclature of standard trade names of imported commercial timbers used in South Africa. *S. Afr. Bur. Stand. Specif.* No. 02-1947 (Suppl. No. 1), 1954, pp. 27. [E.Afric.] P.R.

3320. Specimen woods Nos. 229-31. *Suppls. to Wood* 20 (1-3), 1955. Each pp. 2.

Pycnanthus (Pycnanthus angolensis); *Tshitola (Pterygopodium (Oxystigma) oxyphyllum)*; and *Angelin (Andira surinamensis)*.

3321. [Japanese woods.] *Suppls. to Wood Ind., Tokyo* 9 (12), 1954; 10 (1), 1955. Each pp. 2. [Jap.] P.R.

Include photomicrographs and data on physical and mechanical properties of (a) *Taxus cuspidata*; and (b) *Pinus thunbergii*.

3322. [Uganda timbers.] *Timb. Leaflet. For. Dep. Uganda* Nos. 18-23, 1954.

Cover nomenclature, habit, distribution, frequency, properties, seasoning, preservation, conversion, working qualities and uses of the following timbers under the standard or suggested standard names: (18) *Albizia (Albizia grandibracteata, A. gummifera, A. zygia)* (pp. 2); (19) *Podo (Podocarpus dawei, P. gracilior, P. milanjanus)* (pp. 2); (20) *Nkoba (Lova brownii)* (pp. 2); (22) *Sasswood (Erythrophloeum guineense)* (pp. 2); (23) *Elgon Olive (Olea welwitschii)* (pp. 2).

(21) 'Building timbers', contains notes on seasoning, preservation and selection, and a use guide for the local timbers, grouped under joiners' components, draining boards, carcassing timbers, flooring, roofing, studding, fences and gates, sheds etc. (pp. 4; 6 refs.).

3323. BETTS, H. S. [American woods.] *Amer. Woods U.S. For. Serv. Rev.* ed. 1954.

(a) Eastern White Pine (*Pinus strobus*) (pp. 8; 10 refs.); (b) Black Walnut (*Juglans nigra*) (pp. 8; 10 refs.).

3324. Tableau alphabétique des essences forestières de Guiane pour lesquelles des essais technologiques ont été faits (ou seront prochainement faits) au Centre Technique Forestier Tropical (Nogent s/Seine). [Alphabetical list of the forest species of Guiana for which technological tests have been (or will soon be) made at the C.T.F.T.] [Centre Technique Forestier Tropical, Nogent sur Marne.] [n.d.]. pp. 4. [F.] P.R.

3325. Properties of thinnings of home-grown Sitka Spruce (*Picea sitchensis*). Progress report No. 6—consignment No. 808. Forest Products Research Laboratory, Princes Risborough. 1954. pp. 11 + 8 photos.

[Cf. *For. Abstr.* 16 (Nos. 2122-3).] This material, from Beaulieu, Inverness-shire, was fast grown, with a sp. gr. of 0.305. This was reflected in the strength. It sawed and seasoned well. The better timber would be suitable for e.g. portable buildings and good-class boxes, while the poorer grade III material could be used for cement form-work, edging boards etc.

PROPERTIES AND ANATOMY OF WOOD

3326. NARAYANAMURTI, D. Composite wood timbers: *Taxus baccata*—Yew. *Comp. Wood* 1 (6), 1954 (144–6). 5 refs. P.R.

3327. GERRY, E. Information leaflet. Foreign woods. Plane tree Maple, Sycamore Maple, Harewood, *Acer pseudoplatanus* L. *Rep. U.S. For. Prod. Lab., Madison No.* 2004, 1954. pp. 5 + 1 tbl. 11 refs. P.R.

3328. Emien. [*Alstonia consensis.*] *Bois For. Trop. No.* 38, 1954 (22–6). [F.]

Botanical and silvicultural characters and wood properties.

3329. GERRY, E. Information leaflet. Foreign woods. Ipé Peroba, Peroba do Campo, *Paratecoma peroba* (Record) Kuhlmann. *Rep. U.S. For. Prod. Lab., Madison No.* 2000, 1954. pp. 8. 14 refs. P.R.

3330. GERRY, E. Information leaflet. Foreign woods. Carissa, Corisa, Barriguda, Lupuna, *Chorisia* spp. *Rep. U.S. For. Prod. Lab., Madison No.* 1996, 1954. pp. 5 + 1 tbl. 18 refs. P.R.

3331. La page des bois tropicaux. Aielé. [Tropical woods: *Canarium schweinfurthii*.] *Rev. Bois. Appl.* 10 (2), 1955 (33). [F.]

3332. GERRY, E. Information leaflet. Foreign woods. Lamog, etc., *Planchonia* spp. *Rep. U.S. For. Prod. Lab., Madison No.* 1997. 1954. pp. 7 + 1 tbl. 14 refs. P.R.

3333. Afrormosia, a Gold Coast timber. Flatau, Dick & Co., London. [1954?]. pp. 7. P.R.

The leaflet deals with the tree and its timber; seasoning, strength, durability, working qualities and uses.

3334. GERRY, E. Information leaflet. Foreign woods. Sabicú, *Lysiloma latisiliqua* (L.) Benth. (= *L. sabicu* Benth.). *Rep. U.S. For. Prod. Lab., Madison No.* 2002, 1954. pp. 5. 11 refs. P.R.

3335. GERRY, E., and KRYN, J. M. Information leaflet. Foreign woods. Cativo, *Proripa copaifera* Gris. *Rep. U.S. For. Prod. Lab., Madison No.* 1998, 1954. pp. 9 + 2 tbls. 19 refs. P.R.

3336. Baboen. [*Virola* spp.] *Bois For. Trop. No.* 39, 1955 (25–8). [F.]

Distribution, botanical description, wood properties and utilization of *Virola* spp. (especially *V. surinamensis*, *V. melionii*, and *V. sebifera*).

3337. KRYN, J. M. Information leaflet. Foreign woods. Musizi, *Maesopsis eminii* Engl. (and *M. berchemioides* A. Chev.). *Rep. U.S. For. Prod. Lab., Madison No.* 2001, 1954. pp. 7 + 1 tbl. 13 refs. P.R.

3338. GERRY, E. Information leaflet. Foreign woods. Athel Tamarisk, *Tamarix aphylla* (L.) Karst. (= *T. articulata* Vahl.). *Rep. U.S. For. Prod. Lab., Madison No.* 1986, 1954. pp. 9 + 1 tbl. 17 refs. P.R.

811. *Structure, Identification*
See also Nos. 2725, 3520.

3339. BAILEY, I. W. Contributions to plant anatomy. Chronica Botanica Company, Waltham, Mass. 1954. pp. xxv + 259 + 23 plates. 6 pp. of refs.

Contains 20 papers selected from 113 published by the author, alone or in collaboration, between 1909 and 1953, with cross-references to his other published papers. They are arranged in 8 sections: (1) Cytology and ontogeny—cell division in the cambium of gymnosperms; the formation of the cell plate in the cambium; cytological phenomena in the cambium; increase in girth of the cambium; and the vacuome in living cells. (2) Biochemistry and biophysics—structure, optical properties and chemical composition of the middle lamella (with *T. Kerr*); the visible structure of the secondary wall (with *T. Kerr*); orientation of cellulose in the secondary wall (with *M. R. Vestal*); wood-destroying fungi in enzymatic hydrolysis of cellulose (with *M. R. Vestal*); X-rays in studying orientation of cellulose in cell walls (with *E. E. Berkley*); and the walls of plant cells. (3) Phylogeny—the development of vessels in angiosperms; and evolution of tracheary tissues of land plants. (4) Taxonomy—Degeneriaceae (with *A. C. Smith*); Winteraceae (with *C. G. Nast*); and the conduplicate carpels of dicotyledons (with *B. G. L. Swamy*). (5) Entomology—neotropical ant plants—*Cecropia angulata*. (6) Palaeobotany—identifying wood of mesozoic Coniferae. (7) Wood technology—pit membranes of conifers in relation to preservative treatment. (8) Cooperation in scientific research—research on forestry in the U.S.A. (with *H. A. Spoehr*).

3340. ECHOLS, R. M., and MERGEN, F. How to extract large wood samples from living trees. *J. For.* 53 (2), 1955 (136).

Two $\frac{3}{8}$ -in. holes are bored, with centres 3 in. apart vertically, to $\frac{3}{8}$ in. beyond the pith after locating the latter (in the case of larger trees) with an increment borer. Into these holes are fitted $\frac{3}{8}$ -in. dowels having one flat side to guide a modified keyhole saw in cutting the vertical sides between the holes. These dowels are bored for a $\frac{1}{4}$ -in. nail by which they can be twisted round for the sawing of the other vertical side. A thin chisel is used to finish the vertical cuts, and extractors with ends turned at right angles are wedged to bite into the further (inner) end of the sample by means of a half-inch pipe with a flattened side. It also has a T handle, a twist of which serves to sever the last inner connection. A sample $\frac{1}{2} \times 1\frac{1}{2} \times 8$ in. from cambium to pith can be extracted in one hour. The hole should be plugged.

3341. FREUND, H. Microscopic determination of wood properties. I. Examination of single elements; Fir as an example of a coniferous wood. IV. Maceration process; Basswood as an example of a hardwood. II. Maceration process; The microscopic examination of the composition of papers. V. Laboratory methods for the separation of single fibers from the natural fiber composition. *Transl. Fac. For. Univ. B.C. No.* 4, 1953. pp. 3. *Transl. by J. W. Wilson from Handbuch der Mikroskopie in der Technik Umschau Verlag, Frankfurt am Main.* 1951. Vol. V, Parts 1 and 2 (pp. 1508, 385–7, 402–3, 585–6).

3342. JOHNSTON, D. R. Structure drawings to 'Specimen woods' Sheets 43–5. *Wood* 20 (1–3), 1955 (18; 56; 94).

(43) Binuang (*Octomeles sumatrana*), Kefe (*Pterygota* sp.), Mbembakofe (*Afzelia quanzensis*) and San Domingo Box wood (*Phyllostylon brasiliensis*).

(44) Ramin (*Gonystylus* spp.), African Mahogany (*Khaya* spp.), Abura (*Mitragyna* spp.), and American Whitewood (*Liriodendron tulipifera*).

(45) Musine (*Croton megalocarpus*), Crabwood (*Carapa guianensis*), Ayan (*Distemonanthus benthamianus*), and British Honduras Pitch Pine (*Pinus caribaea*).

3343. BASCOPÉ V., F. Estudios estructurales de ciertas maderas de los bosques del valle de la Mucuy, cerca de Mérida. [The structure of some timbers from the Mucuy Valley, near Mérida.] *Bol. Ingen. for. Univ. los Andes* 1 (5), 1954 (8-15). [Span.]

[Cf. *For. Abstr.* 16 (No. 2136).] *Alchornea grandiflora*, *Billia columbiana*, *Guarea kunthiana*, *Myrcia* sp., *Ternstroemia acrodantha*, and unidentified species of the Melastomaceae and *Zanthoxylum tachirensis*.

3344. STARK, E. W. Wood anatomy of the Aceraceae indigenous to the United States. *Sta. Bull. Ind. agric. Exp. Sta.* No. 606, 1954. pp. 26. 53 refs.

Covers 19 species and varieties of *Acer* and includes 8 microphotographs.

3345. STARK, E. W. Wood anatomy of the Magnoliaceae indigenous to the United States. *Sta. Bull. Ind. agric. Exp. Sta.* No. 607, 1954. pp. 20. 45 refs.

Covers 6 species of *Magnolia* and *Liriodendron tulipifera* and includes 12 microphotographs.

3346. TUMANJAN, S. A. Stroenie drevesiny gruši ruskoi (*Pyrus rossica* A. Dan.). [The wood structure of *P. rossica*.] *Izv. Akad. Nauk armjansk. SSR (biol. sel.-hoz. Nauki)* 7 (3), 1954 (99-102). 5 refs. [Russ.] N.C.L.

P. rossica was recently described as a new species from the central chernozem region (Voronezh) by A. Danilov, who has stated that it differs from *P. communis* not only in leaf, flower, fruit and bark characters, but also in showing somewhat lower values for strength properties of the wood. The author gives a brief account of the anatomy of 2 specimens each of *P.r.* and *P.c.*, sent by Danilov from Voronezh, and tabulates data for the % volumes of lumina, walls and rays in the wood, ray height, and number of square and upright cells per 1 mm. of ray length. The last character appears to show a significant difference, and there were slight differences in the others which might possibly account for the reported difference in strength properties, but much more extensive material would be necessary to establish the diagnostic value of any of these features.

3347. GABRIELJAN, È. C. Stroenie drevesiny osnovnykh kavkazskikh vidov roda *Sorbus* L. [The wood structure of the chief Caucasian species of *Sorbus*.] *Izv. Akad. Nauk armjansk. SSR (biol. sel.-hoz. Nauki)* 7 (4 1954), (73-9). 4 refs. [Russ.arm.] N.C.L.

A brief account of the 12 most widespread species of the region, with a key to species (or groups of two species) based on ray characters (degree of homo- or heterogeneity), relative ring- or diffuse-porousness,

and relative sharpness of transition from early to late wood; there are line drawings of 3 radial sections (illustrating ray structure) and 5 transverse sections.

811.1. Anatomical Elements and Tissues

See also Nos. 2784-6, 3559.

3348. RAPHAEL, H. J. Anatomical changes in Trembling Aspen (*Populus tremuloides* Michx.) induced by the application of chemical agents to the stem. *Quart. Bull. Mich. agric. Exp. Sta.* 37 (2), 1954 (241-7). 5 refs.

The results of this study suggest that bark loosening is caused by a combination of chemical and physical changes occurring in the cambial region and adjacent tissues. The collapse of newly formed xylem cells and the accompanying lacunae, in conjunction with collapse and disintegration of cambial and phloem cells, results in the formation of a belt of weakened material that can be ruptured very easily. Collapse of cells seems to be partially caused by a contraction of the whole phloem region.

3349. HILLER, C. H. Variations in fibril angles in Slash Pine. *Rep. U.S. For. Prod. Lab., Madison* No. 2003, 1954. pp. 6 + 1 photo + 6 gphs. + 2 tbls. 5 refs. P.R.

Research was conducted on 20 trees collected from a natural uncut stand, 20-25 years old. Compression wood and the first ring from the pith were excluded. It was found that trees of the same age and vigour may differ in the size of the fibril angles in corresponding growth rings. Angle size in all consecutive growth rings seems to depend on that of the very first growth ring.

3350. GOMES, A. M. DE AZEVEDO. Morfologia da membrana da célula vegetal (caso particular do xylema); aspectos microscópicos, submicroscópicos e amicroscópicos. [Morphology of the cell wall in plants (with particular reference to the xylem); microscopic, submicroscopic and 'amicroscopic' [i.e. below the limits of the electron microscope] studies.] *Estud. Inform. Serv. flor. aquíc. Portugal* No. 42-C2, 1954. pp. 18 + 10 dgms. 4 refs. [Port.] Limited distribution.

3351. ASUNMAA, S. Electron microscope studies on sections of Aspen sulfite pulp fibres. *Svensk Papp-Tidn.* 58 (2), 1955 (33-4 + 13 photos). 5 refs. [E.g.sw.e.] P.R.

Results are shown in photomicrographs.

3352. FREY-WYSSLING, A. Plant cytology and the electron microscope. *Endeavour* 14 (53), 1955 (34-9). 10 refs.

Illustrates with 13 sub-photomicrographs and 5 diagrams the fibrillar structure of cell membranes and the laminar structure of chloroplasts, the former doubtless related to high tensile strength and the latter to a high rate of metabolism.

3353. FREY-WYSSLING, A., and BOSSHARD, H. H. Fine structure of the closing membrane of bordered pits. *Transl. Commonw. sci. industr. Res. Organ., Aust.* No. 2371, 1954. pp. 6 + 4 photos. 9 refs. Transl. by M. Slade from *Holz Roh- u. Werkstoff* 11 (11), 1953 (417-20). [See *For. Abstr.* 15 (No. 2817).] Limited distribution.

3354. BUVAT, R. Sur la membrane moyenne des ponctions dans le xylème secondaire de quelques dicotylédones. [The pit membrane of the secondary xylem of some dicotyledons.] *C.R. Acad. Sci., Paris* 239 (25), 1954 (1833-5). 3 refs. [F.] O.R.S.

A study of pits of *Castanea sativa*, *Quercus robur*, *Betula alba* s.l., *Aesculus hippocastanum*, *Acer pseudoplatanus*, *Salix cinerea*, *Sambucus nigra*, *Robinia pseudoacacia*, *Liriodendron tulipifera*, and *Magnolia grandiflora* showed that the membrane between cells at least one of which is living (cells of the vascular parenchyma) remains intact and can be stained, while that between dead cells (vessel, tracheid and fibre elements) is very thin, will not stain and is probably porous; the electron microscope would be necessary for a more detailed study.

3355. BANNAN, M. W. The vascular cambium and radial growth in *Thuja occidentalis* L. *Canad. J. Bot.* 33 (1), 1955 (113-38). 136 refs. O.R.S.

The vascular cambium (used in the general sense for the entire meristem producing secondary xylem and phloem) consists of the self-perpetuating uniseriate initiating layer and the derived tissue mother cells. When dormant, the cambium in the stems of mature trees is 1-4 (usually 2-3) cells wide. The 1-3 tangential tiers of cells towards the xylem are made up of xylem mother cells, and the single tier next the phloem of initial cells. On reactivation, all cambial cells expand radially. Periclinal divisions soon follow, usually according to a sequence in which the xylem mother cells in the tier nearest the late wood are the first and the initial cells the last to divide although some variation occurs. The zone of periclinal division rapidly widens to 100-300 μ in vigorous open-grown trees, the centre of activity during this vernal surge of growth clearly being among the dividing and re-dividing xylem mother cells. Then from mid-June to August, a continuing decline in cell production follows as the zone of xylem mother cells decreases from many tangential rows to few. The initiating layer becomes relatively more important as the centre of cell generation and toward the end of the growing season the initial cells undergo those changes that modify the cellular pattern of the cambium and hence the derived tissues. Phloem development begins later than that of the xylem and at the end of May the phloem varies from 0 to 4 cells as compared with 30-60 on the xylem side of the initiating layer. Phloem expansion continues more or less steadily from June to the end of cambial activity in August or September. The annual phloem increments vary less in width than those of xylem. *From author's summary.*

3356. HIDA, M. [The affinity of *Metasequoia* to other conifers as shown by the form of the tracheid.] *Bot. Mag., Tokyo* 66 (783/784), 1953 (239-44 + 1 plate). 11 refs. [Jap.jap.e.] I.M.I.

Tabulates tracheid lengths and bordered-pit arrangement, based on 100 random samples from all parts of each of the following: *Ginkgo*, Taxaceae (2 spp.), *Podocarpus* (2), *Araucariaceae* (2), *Cephalotaxus nana*, Pinaceae (11), Taxodiaceae (10) (including *Metasequoia*), and Cupressaceae (4), almost all

from Japan, and gives photomicrographs of 11 Taxodiaceae. The tracheids of this family and of Araucariaceae are longer than those of other groups of conifers. Taxodiaceae, by the criteria of shape and length of tracheid and number of protoxylem elements in roots, fall into 3 groups. The form and length of the tracheid of *Metasequoia* are indistinguishable from those of *Sequoia* and *Sequoiadendron*, and a new family Metasequoiaceae is not warranted. *Metasequoia*, having long tracheids and fast growth, should prove a useful pulp species.

811.2. Special Features and Abnormal Structure

See also Nos. 3032, 3551.

3357. COZZO, D. Filogenia de los tipos de estructura leñosa estratificada. [Phylogeny related to different types of storeyed structure.] *Repr. from Rev. argent. Agron.* 21 (4), 1954 (196-214). 13 refs. [Span.]

Three types of storeyed structure are distinguished. (1) 'total'—all the elements storeyed; (2) 'partial'—vertical elements storeyed, but not the rays; and (3) 'radial incomplete'—vertical elements and small rays storeyed but not the large rays. To test the validity of the hypothesis that these represent an evolutionary sequence from (3) to (1), species from 250 genera (31 families) were examined and the relative frequency of various anatomical characters was determined for each of the three types of storeyed structure; the characters investigated included length and elongation of fibres, homogeneous and heterogeneous rays, type of parenchyma, number, diameter and type of perforation of the vessels, and occurrence of vasicentric tracheids. In addition, several species of *Bauhinia* were studied, some with and some without storeyed structure. The results furnished no evidence that (3) is less highly specialized than (1), and it is suggested that (1) originates from species with small rays, (2) from a species with large rays only, and (3) from woods with both small and large rays.

811.4. Growth Rings. Early and Late Wood

See Nos. 2784-6.

811.5. Sapwood and Heartwood

See also Nos. 2693, 3550.

3358. WELLWOOD, R. W. Relationships between sapwood and heartwood in second growth Douglas Fir. *B.C. Lumberm.* 38 (11), 1954 (54...57). 7 refs. (*Res. Note Fac. For. Univ. B.C. No. 7.*)

Gives a table of sapwood widths (s.w.) at the top, middle and base of trees to show their variation with (a) dominance class, (b) crown quality (Schädelin system), separately for (c) good and (d) average sites. The s.w. of dominants, co-dominants and intermediates on (c) was not significantly greater than that of their counterparts on (d). S.w. appears to be independent of site except that it increases in the basal section with increasing site index. Within a site class, (a) has an appreciable effect on s.w., and accepting s.w. as a criterion of vigour, dominance class is more important than site. The effect of

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crown quality on s.w. is appreciable on (c) but not on (d). S.w. was not significantly greater in any part of the tree on (c) for any dominance class. On (d) the basal s.w. was significantly greater than that at the middle. In all cases, however, the s.w. at the base was numerically greater than that at the middle. These differences controvert the general view of wider s.w. in the upper parts.

3359. GOOD, H. M., MURRAY, P. M., and DALE, H. M. Studies of heartwood formation and staining in Sugar Maple, *Acer saccharum* Marsh. *Canad. J. Bot.* 33 (1), 1955 (34-41 + 1 plate). 19 refs. O.R.S.

Studies were made on increment borings or on discs or shavings from freshly-felled trees. Colour change between sapwood and heartwood is gradual. A pale amber, post-mortem deposit, deepening progressively and found primarily in parenchyma cells, accounts for the deepened colour of the older wood; pH, water content and mineral contents of the wood do not change appreciably with age. Stains in Maple are due to deposits in the parenchyma cells which, if killed before senescence sets in, produce a post-mortem deposit darker and larger than that from cells dying of old age. The stained regions are distinctly alkaline, contain substantial accumulations of minerals, and have a higher moisture content than normal wood. The consistency with which the stained areas appear in advance of spreading decay fungus suggests that staining and the related chemical changes have a considerable influence on decay.

811.7. Phloem. Bark

3360. CHANG, Y.-P. Bark structure of North American conifers. *Tech. Bull. U.S. Dep. Agric. No.* 1095, 1954. pp. 86. 56 refs. Price 35 cents.

The barks of 57 species belonging to 15 genera were studied. Important structural features and patterns of tissues are recorded in photomicrographs. A comparison table and artificial keys to families and genera are given, based on the findings of the study. In general the key corresponds closely to the natural classification, except in the case of the Cupressoidae. Some chemical tests of bark extracts are described, and structural correlations of wood and bark are summarized.

812. Physical and Mechanical Properties

See also Nos. 2858-9.

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 3435, 3483, 3541, 3548.

3361. TRUAX, T. R. Fire research and results at the Forest Products Laboratory. *Rep. U.S. For. Prod. Lab., Madison No.* 1999, 1954. pp. 9 + 3 photos + 1 gph. 1 ref. P.R.

Investigations on ignition temperature have not yet yielded results that can be used for predicting the behaviour of wood under fire conditions or the performance of fire-retardants. Fire-retarding treatments affect in the first place the fire spread, other factors in spread being size, form, density, moisture content and arrangement. Resistance of wood to

charring is not greatly affected by fire retardants; resistance to destruction by fire is affected by its physical properties and assembly details.

3362. PUNGS, L. [Wood as dielectric in a high-frequency field.] *Elektrotechnische Zeitschrift ETZ [Berlin]* 75A (13), 1954 (433-8). [G.] From *abstr. in Elect. Engng. Abstr.* 58 (685), 1955 (No. 140). P.R.

The anisotropy and frequency dependence of the permittivity and loss-angle of wood were measured from 3×10^2 to 10^9 cycles. Parallel tests on cellulose and cellulose/air mixtures indicated that the anisotropy is caused by the macroscopic structure of the wood, the loss factor by the dipolar structure of cellulose. [Cf. *For. Abstr.* 15 (No. 646).]

812.2. Behaviour with Liquids and Gases.

Moisture Relations etc.

See also Nos. 3369, 3413, 3467-8, 3471, 3480, 3494, 3505-8, 3539-40, 3548, 3553.

3363. JAMES, W. L. Electrical moisture meters for wood. *Rep. U.S. For. Prod. Lab., Madison No.* 1660 (rev.) 1954. pp. 13 + 3 photos + 1 gph + 1 tbl. 18 refs. P.R.

Illustrated description of the resistance type and capacity and R.F. power-loss type moisture meters. The accuracy of measurements is discussed.

3364. MCALISTER, R. H., and MYERS, R. L. The accuracy of an electric moisture detector in green wood. *J. For. Prod. Res. Soc.* 4 (6), 1954 (417-21).

The instrument used worked on the principle of electric conductance, the species tested being *Abies grandis*, *Pinus contorta*, and later *Populus trichocarpa*. Results showing the moisture content of the green wood and the oven-dry m.c. are tabulated. When scatter diagrams were plotted from the results it was apparent that no correlation existed between actual m.c. and the instrument readings. The main conclusion drawn is that this type, and probably all other types, of electric moisture meter are unsuitable for measuring the m.c. of wood above fibre-saturation point. The following positive conclusions are drawn from the data: (1) M.c. varies considerably with position of the sample in the tree radially, the two conifers showing m.c. decreasing from the bark to the pith, and *P. trichocarpa* the reverse. (2) Height within the tree has no effect on m.c. (3) There is some, not clearly determined, relation between sp. gr. based on oven-dry density and oven-dry volume and the actual m.c.

3365. EASTWICK-FIELD, J., and STILLMAN, J. The design and practice of joinery. 2. Movement in timber. *Repr. from Architects' Journal [London]* 120 (3117), 1954 (655-63). P.R.

Includes a table of comparative moisture movement values (per ft. width for each 10% fluctuation in relative humidity) for joinery timbers, and a graph of equilibrium moisture contents for different relative humidities.

3366. The movement of timbers. *Leaflet For. Prod. Res., Lond. No.* 47, 1954. pp. 6.

Tabulated figures are given for over 100 species of hardwoods and softwoods showing the amount of tangential and radial movement occurring for a given change in moisture content. The species are

classified into 3 groups, those with small, medium and large movement values.

3367. KELSEY, K. E., and STEELE, R. L. Project T.P.22. Shrinkage and density of certain New Guinea and Pacific Island timbers. Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 6 + 1 photo + 1 gph. + 6 tbls. 4 refs.

Tabulates shrinkage and density values for 54 species from New Guinea and the Pacific islands. The determinations include shrinkages from green to 12% moisture content and to o.d. state, and basic densities and densities at 12% m.c.

3368. SKAAR, C. Analysis of methods for determining the coefficient of moisture diffusion in wood. *J. For. Prod. Res. Soc.* 4 (6), 1954 (403-10). 21 refs. [New York State College of Forestry, Syracuse.]

The moisture diffusion coefficient D appears in 3 general forms in which the moisture gradient in the wood is defined in terms of: moisture concentration C (wt. of water/unit volume of wood), moisture content M (wt. of water in % of dry wt. of wood), and water vapour pressure h (of the wood). Their interrelationship is shown. A number of steady-state and unsteady-state methods of finding D are described and their value is analysed. Some of the methods have not been applied to wood but they promise to be useful in future research. *From author's summary.*

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 3080, 3364, 3367, 3411, 3413, 3559.

3369. REICHERT, T. A new method of determination of moisture content, solid content of stacked material, basic density, gross weight and shrinkage of wood and specific gravity of cell-wall substances. *Transl. For. Prod. Lab., Can.* No. 83, 1955. pp. 1. Abstr. from *Holz-Zbl.* 76 (86), 1950 (938-40). [See *For. Abstr.* 15 (No. 649).] Limited distribution.

3370. Timber physics. *Rep. Dir. For. Qd.* 1953/54, 1954 (24).

Preliminary analysis of past and current work with Eucalypt regeneration up to 50 years old indicates that a cone-shaped core of wood of low density is developed in the early years of growth. The height of this cone seems to vary with rate of height growth, and there appears to be little correlation of its d.b.h. with the rate of diameter growth at this point. The available samples are small, but there is, perhaps, some reason to believe that, once the stem reaches a certain stage in both height and diameter growth, it begins to put on wood that is within the normal range of density for the species and that, within the range of growth rates likely to be attained in forest conditions, the size of this poor-quality core will not vary to any significant extent from that shown in old-growth stands.

812.7. Strength Properties

See also Nos. 3411-2, 3447, 3469, 3485, 3517, 3530-1, 3548-50.

3371. BOLLER, K. H. Wood at low temperatures. *Repr. from Mod. Packaging* Sept., 1954. pp. 5. P.R.

In general, the increase in strength due to exposure to subnormal temperature tends to offset strength losses caused by other factors (moisture content, imperfections, fastenings) and the product [container] as a whole does not appreciably lose strength as a result of subnormal temperatures.

3372. IORIO, H. Estudio tecnológico de madera plátano. [Study of the wood of *Platanus* spp.] *Revista de Obras sanitarias de la Nación, Buenos Aires* 18 (157), 1954 (105-18). 9 refs. [Span.] L.S.

Presents the results of strength tests made on *Platanus* spp. and a comparison of the values obtained with those of various Argentine species.

3373. ELLWOOD, E. L. Properties of American Beech in tension and compression perpendicular to the grain and their relation to drying. *Bull. Yale Sch. For.* No. 61, 1954. pp. 82 + 4 photos. 37 refs. Price \$1.50.

Results show the relation of strength properties to temperature and moisture content, variation of total shrinkage with drying conditions in relation to drying stresses, development of set and checking, and creep behaviour in tension and compression at selected temperatures and m.c.'s. for constant loads above the proportional limit.

3374. CLARKE, L. N. A strain gauge bridge for creep tests. *J. sci. Instrum.* 31 (8), 1954 (300-1). 1 ref. P.R.

A strain gauge bridge for use in the measurement of creep in wood is described. The bridge has inductive-ratio arms and incorporates a potentiometric method of measuring the out-of-balance voltage. For a gauge factor of 2 the measuring range is $\pm 0.5\%$ strain and it is possible read the bridge directly to 0.0005% strain. The long-time variation is $< \pm 0.001\%$ strain. *Author's summary.*

3375. GROSSMAN, P. U. A., and KINGSTON, R.S.T. Creep and stress relaxation in wood during bending. *Aust. J. appl. Sci.* 5 (4), 1954 (403-17). 18 refs. P.R.

Discusses the influence of deviations from the principle of superposition on the relation between creep and stress relaxation in a visco-elastic body. Pairs of small matched wooden beams were tested in bending, one of each pair at constant load, the other at constant deformation. Results for creep and relaxation are compared to determine whether the relations derived from a linear visco-elastic body can be applied to wood. The irrecoverable component of deformation appears to be non-linearly related to stress in dry wood. The departure from linearity is small in dry normal wood, although more pronounced when compression wood is present. Non-linearity in green wood seems to be of different origin from that in dry wood. Both microscopic and macroscopic compression failures gradually develop in wood maintained at constant high deformation. *Authors' summary.*

3376. ARMSTRONG, L. D., VRIES, J. S. DE, and KINGSTON, R. S. T. Project T.P.16. Rheology of wood. Sub-project T.P. 16-1. Creep in wooden beams. Progress report No. 3. The effect of prolonged loading on the modulus of elasticity of wood.

Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 7 + 1 photo + 3 gphs. 1 ref. P.R.

Small-scale cantilever beams of air-dry Mountain Ash (*Eucalyptus regnans*) were loaded for a period of 37 days under controlled conditions of temperature and humidity, to ca. 7, 14, 27, and 41% of the average modulus of rupture for the species, to study the effect of prolonged loading on the modulus of elasticity of wood. The deflections of the beams increased at gradually decreasing rates during the period of test and reached total values ranging from ca. 113 to 117% of the immediate deflections that occurred on loading. The modulus of elasticity of the wood was found to increase with time by 0.8–1.28% of the initial value. The tests indicate that there is a linear relationship between applied load and % increase in Young's modulus. *From authors' summary.*

3377. KRZYSIK, F., and ORLICZ, T. Wpływ układu słoików rocznych na wielkość siły zginającej. [Effect of growth-ring orientation on the magnitude of the bending force.] *Sylwan* 98 (4), 1954 (249–56). 2 refs. [Pol.russ.e.]

The authors, making the same assumptions as Kollmann ('Technologie des Holzes', 1st ed., 1936, p. 528–9), obtain for the bending-resistance ratio W_2/W_1 (W_2 and W_1 referring to cases where the bending force is $\perp$ and $\parallel$ to the late-wood layers, respectively) a mean value of ca. 1.1 instead of the figure of 0.14 obtained by Kollmann which they attribute to errors in calculation. Their final formula for this ratio contains the magnitude c (proportion of late wood in the cross-sectional area) and the magnitude p/b (p = width of a single late-wood layer; b = length of the side of the square cross-section). For square-section blanks of $b = 20$ –60 mm., $p = 0.3$ –1.5 mm., and $c = 0.2$ –0.8, the values of the bending-resistance ratio vary from 1.001 to 1.23. Bending deflection measurements on Beech and Pine test pieces of $2 \times 2 \times 30$ cm., under a 150-kg. load showed that the corrected deflection ratios (for the force $\parallel$ and $\perp$ to latewood layers) both oscillated round 1, the scatter being ca. 5%.

3378. PEARSON, R. G. The strength of solid timber columns. I. Tests of short duration on model columns. *Aust. J. appl. Sci.* 5 (4), 1954 (363–79). 6 refs. P.R.

A total of 465 model timber columns, $2 \times 1\frac{1}{2}$ in. in cross-section, with lengths varying from $7\frac{1}{2}$ to 75 in. was tested to failure. Variables investigated included species, slenderness, excentricity of load, and orientation of growth rings. Columns of one species [*Eucalyptus regnans*] showed little reduction in strength up to slenderness ratios of ca. 15, in marked contrast to those of other species [*E. eugenoides*, *E. diversicolor* and *Elaeocarpus grandis*] which had a different shape of stress-strain curve. The variation of strains on the faces of the columns with load has been plotted for a number of columns. Orientation of the growth rings had no significant effect on the strength of the columns tested. Much of the variation in maximum loads of columns otherwise similar could be accounted for by variations in maximum crushing stress of the timber and a

simple adjustment of the results to allow for these variations was found practicable. *Author's summary.*

3379. PEARSON, R. G. The strength of solid timber columns. II. Estimation of the strength of timber columns. *Aust. J. appl. Sci.* 5 (4), 1954 (380–402). 16 refs. P.R.

The maximum test loads of over 400 model timber columns [see preceding abstract] are compared with estimated maximum loads. For nominally centrally loaded columns, the tangent modulus Euler formula gave reasonable agreement between test and estimated loads, and illustrated the influence of shape on the stress-strain curve on maximum load. Modifications of the secant and Jezek formulae gave close prediction of the maximum loads of excentrically loaded columns, particularly for slender and for most medium columns for which good estimates of the effective excentricity and Euler stress were obtainable from Southwell plots of the deflections. Some comparisons are made between the estimated buckling loads and effective excentricities of load obtained from plots of the lateral deflections and of the central surface strains. The errors in an approximation for sec x and the relation between the secant and Perry formulae are discussed in an appendix. *Author's summary.*

3380. NORÉN, B. Relation between compressive strength and rate of deformation in testing Swedish Fir [*Pinus sylvestris*]. *Bull. Amer. Soc. Test. Mat.* No. 202, 1954 (43–50). 13 refs. P.R.

In his tests on the effect of the rate of loading on the strength properties of wood, Perem [cf. *For. Abstr.* 12 (No. 374)] used for the most part a constant rate of loading. In this investigation a constant rate of deformation (dR/R) is used, and the strength property investigated is compression $\parallel$. The selection of test pieces and the apparatus used are described and illustrated. The tabulated and graphed results show that the compressive strength $\parallel$ varies as the logarithm of the rate of deformation.

813. Wood Chemistry

See also Nos. 2647, 3559 *et seq.*

3381. PROSIŃSKI, S., KONTEK, W., and BABICKI, R. Skład chemiczny drewna świerkowego w zależności od wieku drzew i zasięgu naturalnego. [Dependence of the chemical composition of Norway Spruce wood on the age of the trees and their geographical location.] *Prace Inst. Tech. Drewna* 1 (1), 1954 (5–22). 17 refs. [Pol.pol.russ.e.] P.R.

The following determinations were carried out on wood specimens taken from two heights (2 and 10 m. above ground) of Spruce aged 38, 52, 60 and 75 years, from 4 different regions of Poland: (1) moisture content, oven method; (2) ash content, incineration at 950° C.; (3) substances soluble in cold water (2 g. wood, 300 c.c. distilled water, 48 hours); (4) substances soluble in hot water (2 g. sawdust, 100 c.c. distilled water, refluxed for 3 hours on water bath); (5) substances soluble in 1% NaOH (refluxed on water bath for 1 hour); (6) substances soluble in 10% KOH (refluxing on water bath for 3 hours); (7) $1/1$ C_6H_6 /ethanol extract (Soxhlet, 1

hour); (8) pentosans (Schorger's modification of Tollens's method); (9) lignin (1 g. sawdust extracted with C_6H_6 /ethanol was treated with 15 c.c. of 72% H_2SO_4 , left in a desiccator for 2 hours, diluted to 588 c.c. and heated on a water bath for 4 hours); (10) cellulose (Kürschner-Hoffer method, HNO_3 /ethanol), and (11) α -cellulose in Kürschner-Hoffer cellulose (1 g. of dry cellulose diluted with 25 c.c. of Mercer's solution, filtered, and washed with 4% NaOH, cold water, hot 10% CH_3COOH , hot water, alcohol and ether); for microscopic investigations, wood was digested with NaOH. The cellulose content was found not to increase with the age of the tree (but was greater for 38 and 60 years than for 52 and 75 years). Specimens from the 2-m. level all have more cellulose than those from the 10-m. level. The maximum cellulose content was found in trees from the northern regions, the minimum from the southern. In the south the fibres were longer than in the north, the longest being found in the 75-year-old trees; the lignin content is almost the same at both heights of the same stem; trees from the north contain more lignin than those from the south.

813.1. Chief Organic Constituents.

Constituents of the Cell Wall

See also Nos. 3339, 3525.

3382. NIKITIN, V. M., and OBOLENSKAJA, A. V. Himičeskii sostav elovyh i pihtovyh balansov. [Chemical composition of Spruce [*Picea abies*?] and Fir [*Abies sibirica*?] pulpwood logs.] *Bumažnaja Promyšlennost*, Moskva 29 (7), 1954 (5-6). [Russ.] P.O.

Tabulates the results of chemical analyses of top- and butt-end logs (12 diameter sizes, 5 specimens of each size, top and butt end of each log) for Spruce and Fir pulpwood (Archangel region). In the Spruce top logs the cellulose content was ca. 47-52%, lignin content 29-30%. In butt logs the differences between the logs were smaller. Fir wood differs but little from Spruce in chemical composition.

3383. FARMER, R. H. Some aspects of the chemistry and utilisation of lignin. *Repr. from Transactions of the Plastics Institute* [London] July, 1954 (134-50). P.R.

Paper presented to the Plastics Institute (Southern Section).

3384. KYURŠNER [KJURŠNER, KÜRSCHNER], K., and SHVEITSPAKHEROVA [ŠVEICPAHEROVA, SCHWEIZPACHER], T. A new method for the quantitative determination of lignin. *Transl. Commonw. sci. industr. Res. Organ. Aust. No. 2364*, 1954. pp. 14 + 1 dgm. 25 refs. Transl. by M. Slade from *Ž. prikl. Him.* 26 (11), 1953 (1176-85). Cf. also *For. Abstr.* 16 (No. 1637). P.R.

3385. GILLET, A., and URLINGS, J. Quelques dissolvants sélectifs de la lignine. [Some selective solvents of lignin.] *Industrie chimique belge, Bruxelles* 17 (3), 1952 (273-5). 2 refs. [F.] P.O.

The authors found triethanolamine and glycerol to be suitable solvents for separating lignin from cellulose in wood. The carbitol (ethyl-diethylene glycol) gives poor results.

3386. MEREWETHER, J. W. T. Studies on the lignin of *Eucalyptus regnans*: VI. Isolation of lignin by alcoholysis [with discussion]. *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 1953 (85-100). 27 refs.

Lignin has been isolated from *E. regnans* by treating extracted wood meal with alcohols in the presence of anhydrous HCl as catalyst. The most satisfactory reagent was found to be ethanol, which gave a good yield of a carbohydrate-free product that could be separated into an ether-insoluble and an ether-soluble fraction, in both of which the ratio OC_2H_5/OCH_3 was 2/9. Benzyl alcohol reacted more rapidly and gave a higher yield of products, but these could not be freed from carbohydrate impurities. Cyclohexanol yielded a product with a low methoxyl content. Dioxan was investigated briefly, and, under the conditions used, some reaction with the lignin occurred. *From author's summary.*

3387. MEREWETHER, J. W. T. Lignin XII. The isolation of lignin by alcoholysis in the absence of air. *Holzforschung, Berlin* 8 (4), 1954 (116-23). 8 refs. [E.g.] P.R.

[Cf. *For. Abstr.* 16 (No. 926).] Lignins obtained by alcoholysis with ethanol and methanol in the absence of air oxygen differ from each other and from products obtained after exposure of these lignins to air, in the number of methoxyl and hydroxyl groups.

3388. KURTH, E. F., and SMITH, J. E. The chemical nature of the lignin of Douglas-Fir bark. *Pulp Paper Mag. Can.* 55 (12), 1954 (125-32). 17 refs.

[Cf. *For. Abstr.* 13 (No. 4409).] This lignin consists of at least two fractions. One contains carboxyl groups, is low in methoxyl content and has been termed 'bark phenolic acid'. It is readily soluble in dilute alkalis and when freshly isolated may be soluble in acetone, alcohol, dioxane or water. It is insoluble in mineral acids and ether. It appears to contain one carboxyl, one methoxyl, 2 alcoholic and 4 phenolic hydroxyl groups for a minimum molecular weight of 850. It is absorbed from an aqueous solution by hide substance and though producing an inferior leather may have special applications in tanning. Another lignin product is extracted with dioxane-hydrogen chloride. It has a methoxyl content comparable with lignins from coniferous wood. These lignins do not give the typical wood lignin reaction with phloroglucin. Details are given of highly reproducible results in paper chromatography and of absorption spectra in this study.

3389. FREUDENBERG, K., and REICHERT, M. Anwendung radioaktiver Isotope bei der Erforschung des Lignins. V. [The use of radioactive isotopes in lignin research, V.] *Chem. Ber.* 87 (12), 1954 (1834-40). 24 refs. [G.g.] P.R.

Describes the synthesis of vanillin-[carbonyl- ^{14}C] and syringaldehyde-[carbonyl- ^{14}C].

3390. FREUDENBERG, K., and ACHTZEHN, G. Versuche mit Coniferylalkohol. [Experiments with coniferyl alcohol.] *Chem. Ber.* 88 (1), 1955 (10-6). 13 refs. [G.g.] P.R.

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Describes the preparation of the coniferyl-alcohol-methyl ether which, when subjected to polymerization or polycondensation, loses a considerable proportion of OCH_3 . The dehydration polymerizate of the ether, obtained with the aid of a redoxase, has the same ultraviolet spectrum as lignin.

3391. GUSTAFSSON, C., and ANDERSEN, L. The formation of dinitroguaiacol by nitration of lignin and lignin models. *Pap. ja Puu* 37 (1), 1955 (1...4). 9 refs. [E.e.] P.R.

3392. NIKITIN, V. M. Ob okislenii lignina kislorodom. [Oxidation of lignin by oxygen.] *Bumažnaja Promyšlennost', Moskva* 29 (10), 1954 (7-10). 2 refs. [Russ.russ.] P.O.

Oxidation with O at 50-90° C. largely destroys [splits up] the molecules of lignin, whereas at 20° O is added to the lignin. At higher temperatures, the extent of oxidation depends on the quantity of alkali present, and not on its concentration. In the absence of O, lignin binds only ca. $\frac{1}{4}$ of the amount of NaOH that it binds when O is present.

3393. ZAIČEVA, A. F., and NIKITIN, N. I. Himičeskii sostav holocelljulozy i gemicelljuloz drevesiny duba i nekotoryh dal'nevostočnyh hvoynnyh porod. [Chemical composition of the holocellulose and hemicelluloses of the wood of Oak and some Far-Eastern conifers.] *Z. prikl. Him.* 27 (9), 1954 (965-74). 16 refs. [Russ.russ.] P.O.

The chlorite method is more convenient than the monoethanolamine method for obtaining holocellulose, although the reproducibility of results is equal for both methods. Average holocellulose yields were found to be: *Quercus fontinale*, 67; *Abies nephrolepis*, 66; *A. sachalinensis*, 70, and *Picea ajanensis*, 71% of the weight of original wood. Successive alkaline extractions gave α -cellulose yields of ca. 38% for the broadleaved, and up to 51% for coniferous species. Total yields of the 4 hemicellulose fractions were 27% (*Quercus*) and 18% (conifers).

3394. STEWART, C. M. The non-resistant components of the wood of *Eucalyptus regnans* F. Muell. Part III. Methanol extractions at elevated temperatures. *Repr. from Holzforschung, Berlin* 8 (3), 1954 (71-7). 22 refs. [E.e.g.] (*Repr. Div. For. Prod. Aust.* No. 240.)

Results of extraction with methanol at 150° C. show that the rate of dissolution of lignin is partly determined by physical processes (perhaps activated diffusion). Klason lignin values seem to be 18% less than the total lignin content. Ca. 5% of the polysaccharide wood fraction is rapidly liberated in methanol-soluble form. Wood substance appears to contain 10-15% of polysaccharides (glycosan uronides) that are not resistant to methanol at 150°; they are easily separated from the resistant polysaccharides which represent ca. 60% of wood substance. It is inferred from physical and chemical behaviour that the original wood contains a chemical complex containing lignin and glycosan uronides. [Cf. *For. Abstr.* 15 (Nos. 2857, 2858).]

3395. POLJAK, A. The decomposition of wood with peracetic acid II. Determination of cellulose by means of peracetic acid. *Transl. Fac. For. Univ. B.C.*

No. 7, 1954. pp. 4. Transl. by D. Mueller-Dombois from *Holzforschung, Berlin* 5 (2), 1951 (31-3). [See *For. Abstr.* 13 (No. 1535).]

3396. SNYDER, J. L., and TIMELL, T. E. The degree of polymerization of the cellulose component of Balsam Fir. *J. Amer. chem. Soc.* 76 (19), 1954 (5003-4). 10 refs. [McGill University.] O.R.S.

3397. SCHOETTLER, J. R. The alkali resistance of the pentosans in Aspen-wood. *Tappi* 37 (12), 1954 (686-94). 27 refs. P.R.

Alpha celluloses containing 8-9% of xylan resistant to extraction by 17.5% NaOH (resistant xylan) were prepared from bleached kraft pulp; α -cellulose isolated from holocellulose retained only 2% xylan. Hydrolysis and paper partition chromatography showed that the higher pentosan content of the kraft-pulp α -cellulose was due to xylose units; its resistant-xylan content could not be reduced even on drastic bleaching with acidified technical NaClO_2 . Alkali-resistant xylan was not formed from the xylan during a kraft cook and the alkali resistance of the xylan in a chlorite holocellulose was not increased by subsequent kraft cooking. A method was developed for isolating a relatively pure xylan from the bleached pulp, by first extracting with 17.5% NaOH, air drying, extracting further with 24% KOH, and recovering xylan from this second alkaline solution. *From author's summary.*

813.2. Minor Organic Constituents.

Extractives. Cell Contents

3398. BUCKLAND, N. J., DALLEY, O. T., and MATHIESON, C. J. The distribution and nature of resinous material in *Pinus radiata* [with discussion]. *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 1953, 1954 (165-82). 14 refs.

A study was made of the horizontal and vertical distribution of non-volatile ether extractives within *P. radiata* trees of 4 different age groups growing in New Zealand. The composition of extracts from heartwood and sapwood, together with the ratios of the alcohol to ether extractives obtained from the same wood sections have also been determined. The data were examined with respect to their possible association with 'pitch' troubles in newsprint manufacture. No definite trend of extractive content with increase of age of tree was observed although the mean extractive content for trees in the higher age group was substantially greater than those for the other age groups examined. The resin content of wood surrounding the pith showed some decrease with height in the tree, this being very marked between the butt and b.h. levels. In the case of the outer low-resin-content wood the amount of ether extractives appeared to be independent of height in tree. The predominating component in the various ether extracts was found to be resin acids, although an increase in the % of fatty acids was found for sapwood compared with heartwood. Age of tree did not seem to have much effect on the ratios of alcohol to ether extractives or on the composition of the ether extracts. In comparison with similar data for other coniferous species used for newsprint production there is no evidence that *P. radiata* trees

within the age range investigated would be unsuitable as a raw material for conversion into newsprint. High-resin-content wood could, if necessary, be eliminated by diverting butt logs to a sawmill or kraft mill, or alternatively, by using the slabwood obtained by milling barked logs from the entire stems. *From authors' summary.*

3399. MEDNIKOV, F. A. Zavisimostj smolododeržanja v svežih sosnovyh pnjah ot vysoty ih stvolnoi časti. [Relationship between resin content in stumps of freshly felled Pine trees and their height above ground.] *Ž. prikl. Him.* 27 (11), 1954 (1213-7). 6 refs. [Russ.russ.] P.O.

The greatest resin content, based on 260 samples above and below ground, from 16 stumps, was found at the root collar.

3400. KONDO, T., and FURUZAWA, N. Chemical studies on *Larix kaempferi* Sarg. I. *Transl. For. Prod. Lab., Can. No. 207*, 1954, pp. 8 + 2 gphs. 16 refs. *Transl. from J. Jap. For. Soc.* 35 (12), 1953 (406-9). [See *For. Abstr.* 15 (No. 4099).] Limited distribution. P.R.

3401. BREDENBERG, J. B., and GRIFENBERG, J. The chemistry of the natural order Cupressales. XIII. The presence of sugiol in the wood of *Juniperus communis*. *Acta chem. scand.* 8 (9), 1954 (1728). 5 refs. [E.] [Institute of Technology, Helsingfors.] O.R.S.

Cf. *For. Abstr.* 16 (No. 2203).

3402. CISNEY, M. E., SHILLING, W. L., LACKEY, H. B., and HEARON, W. M. Researches on conidrin, a lignan from Western Hemlock. *Pulp Paper Mag. Can.* 56 (1), 1955 (86-9). 34 refs.

The lignin α -conidendrin [cf. *For. Abstr.* 7 (Nos. 1224-5)] occurs in *Tsuga*, *Picea*, *Abies* and *Podocarpus* and is recoverable from spent sulphite liquors where such species are pulped. It is a lacticone phenol ether. The physical and chemical properties and derivatives are described.

3403. MAURICE, A., and MENTZER, C. Nouveaux constituants des extraits de bois. III. Sur une microméthode d'analyse structurale des dérivés flavoniques. [New constituents of wood extracts. III. A micromethod [using paper chromatography] of structural analysis of flavonic derivatives.] *Bulletin de la Société de Chimie biologique, Paris* 36 (2/3), 1954 (369-72). 5 refs. [F.] O.R.S.

Cf. *For. Abstr.* 14 (No. 3757).

3404. HASEGAWA, M., and SHIRATO, T. Flavonoids of various *Prunus* species. II. The flavonoids in the wood of *Prunus speciosa*. III. The flavonoids in the wood of *Prunus campanulata*. *J. Amer. chem. Soc.* 76 (21), 1954 (5559-61). O.R.S.

Cf. *For. Abstr.* 15 (No. 1791).

3405. KING, F. E., KING, T. J., and ROSS, J. M. The chemistry of extractives from hardwoods. Part XVIII. The constitution of arjunolic acid, a triterpene from *Terminalia arjuna*. *J. chem. Soc. Nov.*, 1954 (3995-4003). O.R.S.

3406. NATH, B. Chemical examination of the heartwood of *Melia azedarach*. *J. sci. industr. Res., India* 13B (10), 1954 (740-1). 8 refs. D.S.I.R.

Gives results of a provisional study of an un-

identified substance obtained from the wood extract which was named provisionally bakalactone.

3407. Wood extractives. *Colon. Res., Lond.* 1953/1954, 1954 (32-3).

Khaya ivorensis has been found to contain β -sitosterol as well as a resinous material of tannin nature. *Melanorrhoea torquata* has yielded two substances, one of which has been identified as a monomethylether of 3' : 4' : 4 : 6-tetrahydroxy-2-benzylidene coumaran-3-one.

813.3. Ash Constituents

See also No. 3534.

3408. Kieselgehalte van lara-hout. [Silica content of Lara [*Metrosideros petiolata*].] *Meded. Inst. Trop. Amst.* No. 106 (*Afd. trop. Prod.* No. 40), 1954 (30-1, 67). 3 refs. [Du.e.]

Analyses of 61 samples (mainly piles imported from Celebes) gave an ash content of 1.47 and an SiO_2 content of 0.54% in air-dry wood (ranging from 0.19 to 0.89%), or an average of 0.62% in oven-dry wood. The SiO_2 content per cu. cm. is about equal to that of *Dicorynia paraensis* which has an air-dry density of 0.80 as against 1.15 for Lara.

813.6. Effect of Chemicals on Wood.

Resistance to Chemical Attack

See also No. 3498.

3409. ARHANGELJSKIĬ, V. D. O vzaimodeistvii drevesiny i sinteticheskikh smol. [Interaction between wood and synthetic resins.] *Derev. lesohim. Prom.* 2 (2), 1953 [16-17]. 5 refs. [Russ.] *From abstr. in Prace Inst. Tech. Dřevna* 1 (1), 1954 (74). [Pol.] P.R.

Phenol-formaldehyde plastic masses, with wood flour as filler, were subjected to heat-treatment. Under high pressures and at high temperatures the low polymers of synthetic resins react with lignin. Thorough impregnation of wood with synthetic resins depends on its anatomical structure.

813.8. Poisonous and Irritant Properties

3410. LAUDANI, H., and CLARK, P. H. The effects of Red, White and South American Cedar chests on the various stages of the webbing clothes moth and the black carpet beetle. *J. econ. Ent.* 47 (6), 1954 (1107-10).

[Cf. *For. Abstr.* 14 (No. 3770).] Newly made chests of *Juniperus virginiana* (24), *Chamaecyparis thyoides* (16-20), *Cedrela odorata* (16) and *Pinus strobus* (control), were tested over 3½ years for their toxicity at various ages to all stages of *Tineola bisselliella* and *Attagenus piceus*. All Cedars had inhibiting effects on eggs (if laid in the chest), on larvae (particularly the younger) of both insects, and on adults of the moth, but these effects are only partial and are early lost.

814. Natural Durability. Old Wood.

Fossilized Wood

See also Nos. 2704, 3532, 3534.

3411. LUGA, A. A., and SOLNCEVA, A. S. Issledovanie drevesiny 700-letnykh svai. [Investigation of

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the wood of 700-year-old piles.] *Dokl. Akad. Nauk SSSR* 96 (5), 1954 (937-40 + coloured plate). [Russ.] A.P.B.

Describes the macroscopic appearance and some properties of Pine and Oak piles, known to be > 700 years old, found at Riga in 1949. Their diameter varied from 20 to 30 cm., length 1.5-2.5 m., the heads lying ca. 2.5 m. below soil surface and 10-25 cm. beneath the water table. In the Pine, the outermost 2.5-4 cm. was elastic, like cork, readily deformed by thumb pressure, and of a uniform pale greyish-brown colour; on air-drying it cracked transversely and lost its elasticity. The mean strength values for this corky wood in compression || and shear || (in kg./sq. cm.) were respectively 96-97 and 18-27 for air-dry (a.d.; 15% m.c.), and 20-23 and 7-10 for water-saturated (w.s.) wood, its a.d. density being 0.240-0.265. Corresponding values for the 'natural' wood in the interior of the piles were 395-437 and 48-58 for a.d., and 202-242 and 46-71 for w.s. wood, the a.d. density being 0.529-0.562. The strength values for the 'natural' wood fall within the range for modern Pine wood. Between the corky and the 'natural' wood there was a 1-cm. layer intermediate in properties. The formation of corky wood was not limited to the sapwood. In the Oak piles the outer, altered wood had the appearance of 'bog Oak'; it was black, 2.5-4 cm. in depth, and its strength values [order as for Pine] were 218 and 55 for a.d., and 60 and 11 for w.s. wood, the a.d. density being 0.557. Corresponding values for the 'natural' wood were 363 and 91 for a.d., and 144 and 39 for w.s. wood, with an a.d. density of 0.665. This shows some reduction in strength of the 'natural' wood as compared with values for modern Oak. The extremes found for the strength values are tabulated along with a.d. density and some values for radial and tangential shrinkage. The tests covered 180 samples from the piles.

3412. WOOD, L. W. **Structural values of old lumber.** *Rep. U.S. For. Prod. Lab., Madison* No. 2009, 1954. pp. 10 + 5 photos + 1 tbl. 7 refs.

Strength tests made on wood from centuries-old Japanese temples [cf. *For. Abstr.* 14 (No. 2656)], Douglas-Fir railway bridge stringers, and recent tests on floor beams from a 100-year-old church (St. Raphael's Cathedral, Madison) show that, when decay or other abnormal influence is not present, wood does not deteriorate in strength or stiffness from age alone for periods of 100 years or more. A considerable loss of impact resistance may occur after several centuries. *From author's summary.*

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 3358, 3364, 3370, 3381, 3398.

3413. LOE, J. A., and MACKNEY, A. W. **Effect of age on density and moisture content of New Zealand *Pinus radiata* [with discussion].** *Proc. Aust. Pulp Pap. Ind. tech. Ass.* 1953, 1954 (183-94). 4 refs.

Results are presented to show variations in the basic density, green density and moisture content of the stems of plantation-grown *P. radiata* trees 24 to 40 years old. The results indicate that increase in

age results in a general rise in basic density and a decrease in moisture content. In sapwood, green density attains a constant value of nearly 70 lb./cu. ft. when the tree is ca. 30 years old. The study has been extended to include a preliminary examination of the inter-relationship of various factors commonly associated with the presence of heartwood. *From authors' summary.*

3414. KADAMBI, K., and DABRAL, S. N. **On twist in Chir (*Pinus longifolia* Roxb.)** *Indian For.* 81 (1), 1955 (58-64 + 2 photos).

Summarizes previous work on the subject and then gives results of more recent experiments, including an investigation of seedlings, which demonstrated that the tendency to develop twist is inherited and can be recognized in the cotyledons of germinating seeds. Seed from self-pollinated, twisted trees produced 68-82% twisted seedlings. Twist appears to be a dominant character. The practical implications are discussed. [Cf. *For. Abstr.* 13 (No. 4364).]

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

See also No. 3484.

3415. **Sawmill and engineering. Woodworking accidents. Modern machines responsible for improved safety record but position is still 'unsatisfactory'—Chief Factory Inspector's report for 1953.** *Timb. Tr. J.* 212 (4087), 1955 (104-6).

An analysis of accidents by type of machine showing, for a total of 3518, that 47.1, 25.8 and 9.7% occurred with circular saws, planing machines, and vertical spindle moulders respectively. The proper use of the push stick, easily portable adjustable automatic feed attachments, safety-precaution discipline particularly for younger, and better example by older, workmen, sawdust explosion, and lighting and warming of the factory, receive mention. Improvements in safeguards are sometimes resisted by management on the score of expense and by piece-workers because of loss of time.

3416. **[Up-to-date woodworking machinery in Japan.]** *Wood Ind., Tokyo* 10 (1), 1955 (1-56). 3 pp. of refs. [Jap.] P.R.

The latest Japanese types and models of plywood, sawing, planing and other woodworking machines are described in detail, with photos; also the Auto-Dial for speedy measurement of sawn timber. Names, and in most cases addresses, of the manufacturers are given in English. There is a short illustrated section on modern Japanese furniture.

3417. ENGLESON, T. **The grinding technique and its importance for the economy of the use of high-grade cutting tools in the woodworking industry.** *Transl. Commonw. sci. industr. Res. Organ. Aust. No.* 2407, 1954. pp. 14 + 15 photos + 1 dgm. + 3 gphs. 12 refs. *Transl. by H. E. Kijlstra from Pap. ja Puu* 35 (11), 1953 (437-48). [See *For. Abstr.* 15 (No. 2869).] Limited distribution.

3418. RYBALKO, V. S. **Povyshenie stoikosti derevorezuščego instrumenta. [Increasing the durability of wood-cutting tools.]** *Derev. lesohim. Prom.* 3 (9), 1954 (3-8). [Russ.] P.R.

Describes the materials used in the U.S.S.R. for making cutting tools. Presents in graphs, tables, and diagrams the results of tests on cutters made of different steels: (1) the wear in μ plotted against length of cutting in m. (for Oak and Pine); (2) effect of hardness of the steel on wear; (3) outlines of the cutter edges (different steels) after cutting 1000 m. of Oak; (4) effect of wear of the edges on the quality of cut; and (5) power used for cutting with dulled tools. It was found that wear decreases considerably when chips are directly removed by exhausters. The article ends with recommendations for improving output and quality of cut.

821. Barking

3419. **Southern barker review.** *Lumberm.* 81 (13), 1954 (70 . . . 90).

Cf. *For. Abstr.* 16 (No. 953).

3420. KINGSTON, G. L. **Portable barkers.** *Pulp Paper Mag. Can.* 55 (13), 1954 (239 . . . 246). 6 refs. (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1428 (B-7-d).)

[Cf. *For. Abstr.* 15 (No. 2870).] A committee of the Woodlands Section of the Canadian Pulp and Paper Association summarizes the characteristics of 21 portable barkers not known before 1950, nor improved since, under manufacturers, principle of operation, cost, weight, capacity, and crew required, horse-power and limitations. Notes are added on experiments in pretreatment of logs to facilitate barking.

822. Saws and Sawing

See also Nos. 3056, 3455-7.

3421. SUGIHARA, H. [Studies on sawing by bandsaw. 2nd report. Effects of cutting speed and tension stress.] *Wood Ind., Tokyo* 9 (12), 1954 (576-80). 6 refs. [Jap.e.] P.R.

Equations derived from experiments on sawing air-dry Sugi [*Cryptomeria japonica*] are given. From author's summary.

3422. BIRJUKOV, V. A., and ČERNÝŠEV, A. I. Termooobrabotka režuščego instrumenta tokami vysokoi častoty. [Heat-treatment of cutting tools by means of H.F. currents.] *Derev. lesohim. Prom.* 3 (2), 1954 (3-6). [Russ.] From *abstr. in Prace Inst. Tech. Drewna* 1 (1), 1954 (73-4). [Pol.] P.R.

Discusses the merits of H.F. heating of cutting tools, the main use being in the swage-setting of saw teeth. Best results were obtained by heating to 900-950° C. with induction currents; the hardening occurs when the cold swaging tool touches the tooth, while subsequent annealing is due to the high temperature of the tooth base.

824. Forms of Joint. Jointing and Assembly

824.1. Nailed Joints

See also No. 3486.

3423. STERN, E. G. Effectiveness of flooring nails versus toothed fastener. *Bull. Wood Res. Lab., Va. polyt. Inst.* No. 16, 1954. pp. 7. P.R.

824.8. Glues and Gluing

See also Nos. 3459 *et seq.*, 3612.

3424. MARIAN, J. E. Trä och plast: aktuella problem för limnings- och yttehandlingsforskning. [Wood and 'plastics': current problems in gluing and surface treatment research.] *Medd. svenska TräforsknInst. (trätekn. Avd.)* No. 48B, 1953. pp. 12. 40 refs. [Sw.sw.] Also as *Transl. For. Prod. Lab.*, Can. No. 209, 1954. pp. 14. P.R.

A conference paper—mainly a review of literature, but containing some data from the Swedish Wood Research Institute on the costs of different types of scarf joint and on the manufacture of boards and moulded materials from wood waste and resins.

3425. DUPONT, W. Praktische Prüfmethode für Polyvinylacetat-Leime. [Practical methods of testing polyvinyl-acetate glues.] *Holz* 9 (1/2), 1955 (8-10). [G.] P.R.

Describes a simple method of estimating the strength of glue line, in which one of two overlapping wood pieces, with the glue bond along the overlap, is struck by hand against an edge. Other glue properties (e.g. effect of time of open assembly and spreadability) are discussed and the respective tests described.

3426. KÜCH, W. Über die Feuchtbefestigkeit von Holzleimen. [Bonding strength of wood glues in humid air.] *Holz Roh- u. Werkstoff* 12 (11), 1954 (434-42). 6 refs. [G.g.] P.R.

Presents the results of tests (sorption and bonding strength) on different kinds of glue bonds (lap and scarf joints, cross and plywood gluing) effected with casein glue, polyvinyl-acetate glue, and urea-melamine-, phenol- and resorcinol-formaldehyde glues. The synthetic-resin glues proved to be superior to others. Polyvinyl-acetate glues showed satisfactory strength in humid air, although they tended to fail when in contact with liquid water.

3427. LUBOWICZ, J., and WNUK, M. Badania nad wpływem okresu przechowywania kleju albuminowo-kazeinowego na jego siłę wiązania. [Investigations on the effect of storage period on the bonding strength of albumin-casein glue.] *Sylvan* 98 (6), 1954 (529-34). [Pol.]

No significant correlation could be observed between the bonding strength and the period of storage (48 hours) for albumin-casein glues, either for the glue stored as such or for glue whose original viscosity was restored by diluting with water.

3428. WNUK, M. Z badań nad wpływem zawartości wapna na wodoodporność kleju albuminowego. [Effect of lime content on the resistance of albumin glue to water.] *Sylvan* 98 (4), 1954 (327-32). [Pol.]

Introduces the concepts of: (1) absolute resistance of the glue bond to water (ratio of area under the curve showing the decrease of shear strength with increasing wood moisture content (m.c.) up to a certain limit, to that of a rectangle built on the maximum shear strength and the maximum m.c.); (2) relative resistance of the glue bond to water (ratio of areas under the shear-strength curves for the glue bond and solid wood, respectively); and (3) resistance of glue to water (ratio of the areas as in (2)

but for shear strengths expressed in % of their maximum values, i.e. both curves starting from the same point at 0% m.c.). Three-ply test pieces of Birch wood were glued with albumin glue containing different %s of $\text{Ca}(\text{OH})_2$. Maximum resistance to water was found in glue containing 6% of $\text{Ca}(\text{OH})_2$ (on the basis of weight of dry glue); pure glue had a lower resistance, and glues with $\text{Ca}(\text{OH})_2$ in other proportions, still lower resistance. The glue with 6% $\text{Ca}(\text{OH})_2$ also made bonds possessing a higher shear strength than pure glue, whether with wood of 10% m.c., or subjected (a) to water at 20° C. for 60 min. or (b) to boiling water for 90 min.

3429. PERKITNY, T., and CHUDZIŃSKI, Z. Kryteria oceny kazeiny klejowej. [Criteria for the appraisal of glue casein.] *Prace Inst. Tech. Drewna* 1 (1), 1954 (38-57). 5 refs. [Pol. pol. russ. e.] P.R.

Laboratory tests showed that there exists only a very faint correlation between the chemical properties of casein (water, protein, galactose, ash, fat contents, content of extraneous materials, acidity, solubility in borax, and specific viscosity of the solution in borax) and the properties of casein glue (strength, resistance to water, viscosity of the glue, and quantity of glue obtained from 1 kg. of casein). The following simplified tests for each shipment of casein are recommended: (1) use 24 test-pieces of Birch (shear test, Polish standard) with a glue consisting of 100 parts by weight casein, 10 parts $\text{Ca}(\text{OH})_2$ and 550 parts water, (2) determine the absolute and relative (%) glue strength for these test-pieces after soaking them in water of 20° C. for 1 hour, and (3) evaluate the results according to the authors' table (very good glue material if the mean absolute strength is > 30 kg./sq. cm., unsuitable if < 20 kg./sq. cm.).

3430. ZEIGLER, J. L., and HALME, G. J. Gluing hardboard with protein adhesives. *J. For. Prod. Res. Soc.* 4 (6), 1954 (422-6).

Concludes that protein adhesives are suitable, both as regards properties and fairly low cost, for gluing hardboards.

3431. FISCHER, F. Ein neuer Harnstoffharzleim für Spezialanwendungsgebiete, Kaurit HF Plv. [A new urea resin glue for special uses, Kaurit HF Plv.] *Holz* 9 (1/2), 1955 (10-1). [G.] P.R.

Two parts of the glue + one part of water give a mixture that can be used for 3-5-4 hours at 20° C. Setting times as short as 5 sec. can be obtained in HF fields, and the glue line obtained is resistant to water (in the sense of instructions for plywood gluing).

3432. Synthetic resin glues in the building industry. Part 1. *Bull. Aero-Res., Duxford* No. 142, 1954. pp. 6. P.R.

Some notes on new timber roof trusses built with 'Aerolite' 300.

3433. 'Aerolite' 300 for boat building. *Bull. Aero-Res., Duxford* No. 141, 1954. pp. 6. P.R.

3434. HYLER, J. E. Glues and gluing. Parts 50 to 55. *Sth. Lumberm.* 189 (2369), 1954 (211...213); 190 (2370-2374), 1955 (41...46; 45...50; 41...46; 47...52; 43...48).

Glue spreading and pressing.

3435. KULL, W. Die Erwärmung von parallel-flächigen Stoffen zwischen Heizplatten und die Bestimmung der Heizzeit bei der Holzverleimung, insbesondere bei der Spanplattenherstellung. [Heating of parallel-face material between heating plates and determination of heating period during the gluing of wood, particularly in the manufacture of chipboards.] *Holz Roh- u. Werkstoff* 12 (11), 1954 (413-8). 1 ref. [G.g.] P.R.

The process of heating parallel-face material between heating plates is analysed as consisting of 4 partial processes: (1) establishing the natural temperature gradient between the surface and the 'thermal symmetry' plane; (2) filling up the existing temperature gradient, i.e. raising the temperature of the plane core; (3) evaporation (partial or total) of the wood moisture; and (4) glue curing. The final formula for the total heating period (in min.) is

$$T = \frac{3S^2 r_u}{\lambda} \left(c \left[\frac{1}{2} + \log_e (\theta_h - \theta_a) - \log_e (\theta_h - \theta_c) \right] + c_v \frac{un^2}{(\theta_h - \theta_v(1+u))} \right) + t_4$$

where S is the half-thickness of the board, r_u = the density of its wood material (of moisture content u), λ = heat conductivity of same, c = its specific heat, θ_h , θ_a , θ_c and θ_v = temperatures respectively of the heating-plate, board (initial), core (final), and water evaporation, θ_v = the latent heat of evaporation of water, and n = the fraction of the total moisture that evaporates during heating; t_4 is the time required for effecting the curing of the glue. Four examples are calculated using the above formula, the results being represented in graphs. A new approximate formula is suggested for the heating time $T \approx b(1 + D^2)$, where D is the board thickness in cm., and b is ≈ 4 min. for wood gluing (with $\theta_h = 100^\circ \text{C.}$), and $b \approx 2-3$ min. for the manufacture of chipboards ($\theta_h = 140^\circ \text{C.}$).

3436. ZABRODKIN, A. G. [Suitable thermal conditions for gluing wood with urea-formaldehyde resins.] *Derev. lesokim. Prom.* 2 (6), 1953 (15-9). [Russ.] From *abstr. in Chem. Zbl.* 124 (15), 1954 (3369). L.S.

When heated, these resins lose ca. 51% by weight in the form of volatile constituents, including 22-23% water. Temperatures above 100° C. should be avoided in veneer [plywood?] manufacture; although no free HCOH is split off even at 110°, it is not necessary to raise the temperature above 100°, to activate the resin. Resin activation proceeds at a much slower rate at higher temperatures (up to 160°). The veneer assemblies should be heated to 95°, within 1 min. There is no point in keeping the assembly long in the press, since the hardening of the urea-formaldehyde resin is completed within 25-30 sec.

3437. PETERSON, R. W. Edge-gluing by dielectric heating. *Comp. Wood* 2 (1), 1955 (1-5). P.R.

Describes the preparation of wood glues and the glue spread, power requirements, durability of the joints obtained, and the equipment involved, production and costs.

3438. GRAHAM, P. H. Electronic assembly gluing. *Sth. Lumberm.* 189 (2369), 1954 (148-50).

TIMBER INDUSTRIES AND PRODUCTS

3439. THEILE, H. U. Die Verleimung von Holz, Pappe und Papier im hochfrequenten Kondensatorfeld. [Gluing of wood, cardboard and paper in HF condenser fields.] *Holz* 9 (1/2), 1955 (3-8). [G.] P.R.

A brief exposition of the theory and practice of the use of HF fields in gluing.

3440. SORSA, B. Liimojen kovetus radio-kuumennuksen avulla. [Setting glues with radio-frequency heating.] *Tied. Valt. tekn. Tutkimusl. No.* 132, 1954. pp. 27. 9 refs. [Fie.] P.R.

The glue, usually resin, should be unlikely to burn and of a fast-setting type. Correct assembly of the electrodes is important for even setting. Heating time is affected by wood density, increasing with increasing density. Moisture contents of 12% or below do not affect heating time. [Illustrations, including a diagram of electrode arrangement and graphs showing the effect of different factors on heating time, have English legends.] *From author's summary.*

827. Bending. Moulding (other than by Cutting)

3441. STEVENS, W. C., and TURNER, N. A new type of steaming retort for wood-bending purposes. *Wood* 20 (1), 1955 (10-2). 1 ref.

Evolved at Princes Risborough, the retort consists of an open-ended box into which the pieces to be bent are loaded in rows, with spacers separating each row so that only those portions of each piece that are to be bent are subjected to saturated steam. When used instead of the conventional type of retort, for hairpin bends (as in the backs of Windsor chairs) there is much less distortion and fracture. A similar method using radio-frequency is also described. [Cf. *For. Abstr.* 15 (No. 2898).] *From authors' summary.*

828. General Carpentry and Joinery

3442. EASTWICK-FIELD, J., and STILLMAN, J. The design and practice of joinery. 3. An analysis of construction. *Repr. from Architects' Journal* [London] 121 (3124), 1955 (51-9). P.R.

Analyses the principles that must govern the use of timber in joinery.

829.1 Finishing

3443. WELLWOOD, E. W. Effect of paint sealer on buckling tendencies of hardboard panelling. *J. For. Prod. Res. Soc.* 4 (6), 1954 (15-A).

Face-sealed panels exhibited less tendency to buckle than non-treated ones, the difference becoming less significant with increasing time of exposure and amounts of moisture present.

3444. BROWNE, F. L. Swelling of paint films in water. II. Absorption and volumetric swelling of bound and free films before and after weathering. *J. For. Prod. Res. Soc.* 4 (6), 1954 (391-400). 7 refs. Cf. *For. Abstr.* 15 (No. 2903).

3445. DICKINSON, T. A. Heat treatment for wood. *Wood Wkg. Dig.* 57 (1), 1955 (69). P.R.

Tough and attractive finishes on wood handles for garden tools are obtained by passing a top-quality

Ash pole through a white-hot furnace (ca. 1800° F.), then sanding it and coating with a special sealer.

3446. Stains in timber. *Timb. Inform. Timb. Developm. Ass.* No. 44, 1955. pp. 6.

Discusses the different types of stain (fungal, chemical and mineral and seasoning discolorations) and their removal and gives a tabular key to causes of different stains, and a list of proprietary bleaches.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

831. Fuelwood and Various Types of Rough Timber

See also Nos. 3303-4, 3510-2, 3532.

3447. SISWICK, E. S. Eccentric vertical loads on Southern Pine poles. *Electric Light and Power, Chicago* 32 (9), 1954 (79-83). *From abstr. in Elect. Engng. Abstr.* 58 (685), 1955 (No. 151). P.R.

Extensive field tests were made for establishing the permissible maximum load by transformers or outriggered arms on various sizes of poles. Results are given in graphs showing the deflection in in. at various heights above ground. A table shows the maximum transformer weights for several lengths and classes of poles, the average weights of distribution transformers of older and more recent design, and the minimum [size-?] class of pole required to support outriggered power conductors for various numbers of wires supported and various span lengths.

3448. WOLOSEWICK, F. E. Characteristics of H-frame wood-pole structures for 230 kV lines. *Electric Light and Power, Chicago* 32 (11), 1954 (96-102). *From abstr. in Elect. Engng. Abstr.* 58 (685), 1955 (No. 150). P.R.

Original research and experimental investigation were necessary to produce a practical design of wood support for such lines. The article describes the special problems that arise with wood, mainly due to the large deflections, and the methods used to overcome them.

3449. Creosoted wooden telephone, telegraph, electric light and power transmission poles. *S. Afr. Bur. Stand. Specif.* No. 339-1951, (repr.) 1953. pp. 34. [E.Afr.] Price 5s. P.R.

3450. HARDER, H. Die neue Sortierung der Holzmasten nach technischen Grundsätzen und die Ermittlung des Festgehalts. [New grading for wooden poles, based on technological principles, and the determination of their volume.] *Holz-Zbl* 81(6), 1955 (49-50). 8 refs. [G.]

Discusses in some detail considerations underlying the revised (1954) German standard DIN 48350 (wooden poles). The optimum taper is 0.7 cm./m., this being the compromise between the bending strength and preservation requirements. Grading should be based on neither top nor bottom diameter alone, but on both; a relevant table prepared by the Hamburger-Elektricitäts-Werke A.G. is presented. Taper frequency-curves for *Pinus sylvestris* and *Picea abies* are given, as well as a curve showing the relationship between pole volume and taper.

3451. Z., P. Die neuen Bedingungen für Holzmasten nach DIN 48350. [New requirements for wooden poles in accordance with the German standard DIN 48350.] *Holz-Zbl.* 81 (17), 1955 (195). [G.]

[Cf. preceding abstract.] Contains a table giving for different pole sizes (length and bottom diam.) the length tolerance, minimum bottom and top diameters, safe tension value at the top, and volume (for preservation purposes). Permissible species are: *Pinus sylvestris*, *Larix leptolepis*, *L. decidua*, *Picea abies*, *Abies alba*, and *Pseudotsuga taxifolia*.

3452. Chemically impregnated wooden posts and droppers for farm fences. *S. Afr. Bur. Stand. Specif. No.* 457-1954. 1954. pp. 28. [E.Afr.] Price 5s. P.R.

3453. MARKWARDT, L. J. The role of inspection in wood ladder safety. *Rep. U.S. For. Prod. Lab., Madison No.* 1994, 1954. pp. 18 + 14 photos + 1 dgm. + 1 gph. 11 refs. P.R.

Describes different causes of wood failure in ladders, and gives instructions for their proper maintenance, design and storage.

832. Mills, Their Functions and Products

832.1. Sawmills and Planing Mills

See also Nos. 3315, 3421, 3552, 3615.

3454. HYLER, J. E. Modern sawmilling. Parts 11 to 16. *Sth. Lumberm.* 189 (2369), 1954 (227... 234); 190 (2370-2374), 1955 (47... 52; 51... 64; 47... 52; 53... 58; 49... 52).

Handling logs in the mill; and labour relations.

3455. SKJELMERUD, H. En orientering om norske sirkelsagbrukstyper. [A survey of types of circular sawmill in Norway.] *Træindustrien* 4 (12), 1954 (167-73). [Nor.] P.R.

Discusses, with illustrations, types of saw commonly used and the most frequent sawmill lay-outs, comparing production and costs for 5 types. [Cf. *For. Abstr.* 15 (No. 4178).]

3456. [An example of studies on operations at a sawmill.] *Bull. For. Exp. Sta., Meguro, Tokyo No.* 68, 1954 (215-28). 8 refs. [Jap.jap.]

A detailed analysis of the working and operational costs of a small commercial bandsaw mill (electric-powered) in Tokyo. Data include outturn in koku per h.p. (0.78), per operator (3.79) and per KWH (0.45). The mill was adjudged to be comparatively efficient.

3457. CALVERT, W. W. Increasing hardwood lumber yields with the short-log bolter. *Timber of Canada* 15 (6), 1955 (25-7, 32-3, 42-3).

A contribution of the Ottawa Laboratory. Illustrates graphically the grade recoveries (White Ash), sawing time, and production in lengths by the bolter and by conventional circular headrig. Bolts (up to 5 ft.) show advantages in recovery and in accuracy of sawing, can supply only a part of the length requirement of furniture makers, but compare well in production per man. This type of conversion is important for the small hardwoods available now in second growth.

3458. SZMIT, J. M. Badania nad wydajnością materiałową drewna bukowego. [Investigations on the yield of sawn timber from Beech logs.] *Sylvan* 98 (5), 1954 (408-18). [Pol.russ.e.]

Presents the results of experimental conversion of 303 low-grade Beech logs (totalling 286.9 cu.m.) from an experimental forest near Elblag (former East Prussia), growing on a ground moraine at 50-150 m.; other details: Beech stands 85-125 years old, mean height 28 m., mean d.b.h. 33 cm., site quality I, density 0.8, canopy density variable, growing stock 260-410 cu.m./ha. The logs showed curvature, with many knots (also 'blind' knots, mostly rotten), and a large % of zonal and star-shaped false heartwood. They averaged quality III, the % by volume of logs of qualities I, II and III being 7.1, 30.1 and 62.8% respectively. Logs of quality I/II were converted into furniture-trade squares (25, 38, 45, and 60 mm. square); quality-III logs into untrimmed boards. The % of boards of I-IV quality was 5.0, 12.7, 74.6, and 7.7%, respectively; nearly one-half of the quality-I/II boards (suitable for the manufacture of squares) was obtained from quality-III logs.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 3425 *et seq.*, 3473-4, 3583, 3615.

3459. PERAZA ORAMAS, C. Empleo, en construcción, de maderas mejoradas por encolado y tableros de residuos. [The constructional use of glued wood products and waste-wood boards.] *Montes, Madrid* 10 (56-59), 1954 (127-32; 195-200; 279-83; 339-44). [Span.]

Reviews methods of producing glued products and fibreboards, types of glue, properties of laminated products, and types of glued product and their uses. Figures are included for Spanish imports of veneer woods from Spanish Guinea in 1951.

3460. RAMAMRITHAM, S., and NARASIMHAN, R. Use of indigenous [Indian] timber for development of aircraft quality plywood. *Comp. Wood* 1 (6), 1954 (138-44). 4 refs. P.R.

Aircraft-quality plywood, meeting the requirements of grades A and B, can be manufactured from *Dalbergia latifolia*, *Mangifera indica*, and *Dichopsis elliptica*, separately or in combinations. Results of tests on a dozen types of plywood are tabulated.

3461. KOLLMANN, F. Studien über die Ausbeute in der deutschen Sperrholzindustrie. [Output studies in the German plywood industry.] *Holz Roh-u. Werkstoff* 12 (12), 1954 (465-71). 5 refs. [G.g.] P.R.

Draws conclusions from data supplied by 11 large West German plywood plants. The following production losses are analysed for Beech, Gaboon [*Aucoumea klaineana*] and Limba [*Terminalia superba*] plywood: losses during conversion of logs into billets, barking, peeling, clipping, drying, jointing, pressing, trimming, sanding, and final trimming of faulty panels.

3462. MITIN, A. G. K voprosu ob effektivnosti novykh metodov luščenija špona. [Efficacy of new

methods of veneer peeling.] *Derev. lesohim. Prom.* 3 (12), 1954 (15-8). [Russ.] P.R.

Test peelings of Birch logs 18-28 cm. in diam. have shown that the division of the process into rounding and peeling proper is uneconomical. The author suggests trying a set-up where the trash and roundings would be collected at a lower level for trimming by a special clipper, leaving the continuous band of veneer to be conveyed at a higher level to another clipper.

3463. KORENEV, N. I., and MARGOLIN, S. S. Izgotovlenie fanery iz osiny na belkovykh klejakh. [Manufacture of plywood from Aspen wood with albumin glues.] *Derev. lesohim. Prom.* 3 (10), 1954 (25-6). [Russ.] P.R.

A table gives the steaming times for veneer bolts of different diameters for Aspen, compared with Birch and Alder, as determined for winter and summer conditions in Belorussia. During peeling of Aspen, the pressure bar should not be below the level of the knife; the thickness of the veneer as it comes from the peeler should be 10% greater than for Alder. The lowest temperature of peeled Aspen bolts should not fall below 7-10° C. The permissible final moisture content of Aspen veneer for making plywood with protein glues is 4-5%. A table shows the seasoning schedules for this veneer (1.1 and 1.5 mm. thick). The amount of glue used for 1 sq. m. of veneer surface is equivalent to 28-30 g. of casein. Aspen plywood must be held longer in the press than Alder or Birch.

3464. WALTER, W. Die Furniertrocknung. Praktische Mittel zur Bestimmung und Verminderung der Ungleichförmigkeit. [Veneer drying. Practical methods of determining and reducing unevenness.] *Holz Roh- u. Werkstoff* 12 (12), 1954 (463-5). [G.g.] P.R.

The main causes of uneven drying of veneer sheets in multiple-deck driers are: a more thorough drying of veneer edges, the uneven initial moisture content, and the uneven drying output at different points of the drier. To assess the last-mentioned factor, a method has been developed, based on the measurement of the heat (in kcal./sq. m./min.) transferred to the moist veneer during the time of passage through the drier. This heat is calculated from the weights and temperatures of a veneer sample immediately before, and after, the drying. The data obtained for the different decks (3 levels for each deck) and 3 positions (centre, right-hand edge and left-hand edge of the track) are easily presented in a diagram [exemplified].

3465. STERLIN, D. M. Suška špona v rolikovykh sušilkah topočnymi gazami. [Veneer drying in roller driers by means of exhaust gases.] *Derev. lesohim. Prom.* 3 (9), 1954 (17-21). [Russ.] P.R.

Investigations at the Soviet Central Plywood and Furniture Research Institute show that, in some cases, Birch veneer can be successfully dried at 250-300° C. in a roller drier. A graph shows the relationship between the output of a 16.2 m.-long roller drier and the mean air temperature. When using steam radiators it is possible to increase the output by (1) increasing the surface area of the radiators from 420 to 1000 sq. m., and hence the

temperature to 130° and the output from 12 to 15.8 cu.m./shift, and (2) substituting transverse air circulation for longitudinal, with a simultaneous increase of the radiator surface to 1200 sq. m. and temperature to 140°, so reaching the maximum output for steam-heated driers, viz. 20.5 cu.m./shift. When the drying medium, e.g. exhaust gases, has a temperature of 200°, the output rises to 28 cu.m./shift. It was found that when the temperature is raised from 110 to 180°, the drying rate for convection-type (air) driers increases only by ca. 60%, against ca. 110% for roller driers. This considerable difference is due to roller drying being a combination of convection and contact [conduction] drying, the latter component becoming more and more important at higher temperatures. The experimental CNIFM-7 roller drier adapted for exhaust-gas heating is illustrated and its operation described. A table shows operational data for this drier, and for 2 Soviet, 1 Swedish and 1 Finnish steam-heated roller driers. The cost of drying per cu.m. in the new drier is ca. $\frac{1}{2}$ that of other driers.

3466. ŠTAMM, A. M. Ustranenie obzola i slabyyh uglov pri pressovanii fanery. [Elimination of rejects due to undersize sheets and weak corners in plywood manufacture.] *Derev. lesohim. Prom.* 3 (11), 1954 (15-6). [Russ.] P.R.

Plywood sheets must be trimmed when one of the plies is under size or the edge or corner has weak glue lines. Both defects are due, in the first place, to unequal dimensions and deviations from rectangular shape of the individual veneer sheets. The total length allowance of raw veneer sheets gives no guarantee that the dried sheets will have a length ≤ 160 cm. When the moisture content falls from 24 to 12% a raw veneer sheet will shrink from its original 172 to ca. 166 cm., leaving 6 cm., which is sufficient for clipping defects; but when the ultimate m.c. is, say, 6%, this allowance is often too small. It is suggested that an accurate check should be made of the dried veneers, so as to use for the standard plywood sheets only full-size veneer of identical size and shape. The shorter, and out-of-square, sheets should be trimmed, and the missing strips should be glued to them, so as to give the standard size. The author designed a semi-automatic clipper for such trimming. Plywood (308 sheets) made from this veneer had only 2% sheets with undersize plies, compared with 10% under normal conditions; the number of 'weak corners' was ca. $\frac{1}{2}$ of normal.

3467. RINNE, W. J. Viilun pakstusvaihtelu vanerinvalmistuksen eri vaiheissa. [The thickness of veneer in the various stages of plywood manufacture.] *Pap. ja Puu* 37 (1), 1955 (9...12). [Fie.] P.R.

Studies on 1.5- and 4-mm. plywood showed that during drying the thickness of the wet veneer was reduced $3.5 \pm 0.5\%$ and the width $7.5 \pm 2.8\%$. The thickness reduction during hot pressing has not been determined but does not exceed 3%. The thickness loss in finishing was $11.0 \pm 2\%$ for 4-mm. plywood. From author's summary.

3468. TUTUMOTO, T. [Moisture and shrinkage variation of *Fagus crenata* veneer in the drier.]

Wood Ind., Tokyo 9 (10), 1954 (465-9). 7 refs. [Jap.e.] P.R.

Results of measurements are shown in graphs with some English legends.

3469. CURRY, W. T. **The strength properties of plywood. Part 2. Effect of the geometry of construction.** *Bull. For. Prod. Res., Lond.* No. 33, 1954. pp. 28 + 4 plates. 9 refs. Price 2s.

[Cf. *For. Abstr.* 15 (No. 2923).] Equations are presented for calculating bending, tension, compression and shear strengths of any plywood construction, using basic data on $\frac{3}{8}$ -in. plywood. Results obtained with the equations have been checked against test figures for plywood of various thicknesses from *Aucoumea klaineana*, and reasonably close agreement was found. Agreement might not be so close for other species, but it is believed that the methods are suitable for general application and that tabulated basic strength values given for some 27 species can be used for estimating the strength of plywood made from one or more species of wood. An example is given of the use of the data in determining strength of a $\frac{1}{2}$ -in. plywood of 1:2:2:1 construction, with face and back of *Mimusops heckelii* and core and crossbands of *Gossweileroden balsamiferum*.

3470. PERRY, T. D. **Waterproof plywood. Approved methods of manufacture and utilization. Correcting some prevalent misconceptions.** *Sth. Lumberm.* 189 (2369), 1954 (216 ... 222).

3471. KOBLOKOVA, A. G. **Vlagoprovodnost' kleenoi sloistoï drevesiny. [Moisture conductivity of glued wood laminates.]** *Derev. lesohim. Prom.* 3 (12), 1954 (7-11). 4 refs. [Russ.russ.] P.R.

Experiments on solid wood, thick-veneer and thin-veneer laminates and casein glue have shown the equilibrium moisture content of laminates to lie between those of solid wood and of glue, approaching the curve for the latter at air humidity (ratio) > 75%. Moisture conductivity was determined for stabilized conditions in the tangential, radial and longitudinal directions, stabilization being reached after 16, 12, and 48 days respectively. In the longitudinal direction the moisture movement rate at first decreased. Moisture gradients in the specimens tested (thickness 20 mm., diam. 41 mm., veneer thicknesses 1, 2, and 2.8 mm.) were slightly S-shaped. The calculated coefficient of moisture conductivity (c.m.c.) attained a maximum at ca. 20% wood moisture content when the r.h. on the 'dry' side was 36 or 54%, and a very diffuse maximum at ca. 27% m.c. for 79% r.h. The c.m.c. in the 3 directions referred to above were roughly in the ratios 1/1.125/9. C.m.c. decreased (a) as the r.h. on the 'dry' side increased, particularly in the range 55-100%, (b) when the number of layers (and glue lines) increased and when the moisture movement was longitudinal. The c.m.c. of Birch laminates was calculated to be inferior to that of solid wood, both in the tangential and radial direction.

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

See also No. 3432.

833.1. Building Components and Fittings: General

3472. **Thinnings for house building.** *Timb. Tr. J.* 212 (4089), 1955 (85-6).

Notes on a joint experiment (T.D.A. and British Forestry Commission) on prototypes for building with prefabricated panels made from softwood thinnings (logs 4-12 in. diam. x 43 in.-15 ft. long). [Cf. *For. Abstr.* 16 (p. 303).]

3473. GERMAIN, S. **Le contreplaqué et le coffrage. [Plywood for shuttering.]** *Rev. Bois Appl.* 10 (1), 1955 (6-9). [F.]

Discusses the suitability of plywood for shuttering, its adaptability for different types of shutter, and the main types of plywood involved.

3474. GERMAIN, S. **Notes sur la mise en œuvre du contreplaqué de coffrage. [Application of plywood in concrete shuttering.]** *Rev. Bois Appl.* 10 (2) 1955 (20-2). 4 refs. [F.]

Discusses the cutting of plywood to the required shape, oiling, and assembling it into shuttering, and the selection of the best type of plywood for different kinds of shuttering.

3475. **Hardwoods for industrial flooring.** *Leaflet. For. Prod. Res., Lond.* No. 48, 1954. pp. 11. 2 refs.

Details of 29 suitable hardwood species are given in tabular form showing source of supply, weight, description of the wood, and comments on the nature of service to be expected. Photomicrographs of the transverse section are also given. [Cf. *For. Abstr.* 10 (No. 279).]

3476. **[Flooring timber from *Byrsonima spicata*.]** *Rep. For. Dep. Trin. Tob.* 1953, 1954 (16).

Preliminary reports of tests on Serrette [*B. spicata*] logs indicate that this is an excellent, hard-wearing flooring timber.

3477. **African hardwood flooring (block and strip).** *S. Afr. Bur. Stand. Specif.* No. 458-1954. pp. 24 + 11 dgms. [E.Afr.] Price 5s. P.R.

3478. **Eucalyptus (Gum) wood blocks for floors.** *S. Afr. Bur. Stand. Specif.* No. 340-1951. pp. 20 + 1 tbl. Price 5s. P.R.

3479. **Code of practice for the laying of wood block, board and strip floors.** *S. Afr. Bur. Stand. Specif.* No. 043-1954, 1954. pp. 37 + 5 dgms. [E.Afr.] Price 5s. P.R.

3480. KARLSEN, O. **Fuktighetsopptak i gulvbord under lagring på byggeplassen. [Uptake of moisture by flooring during storage at building sites.]** *Medd. norsk tretekn. Inst.* No. 6 [1954]. pp. 14 + 6 gphs. [Nor.e.] P.R.

A total of 288 floor boards were dried to about 9% m.c., cut to size and tied in bundles of 18; 15 of the bundles (1) were left completely unwrapped, (2) had the ends covered with asphalt sandwiched between layers of kraft paper, or (3) were wrapped with the ends left open, in asphalt sandwiched in kraft paper. In one single bundle, (4), stickers were placed between the boards, and it was left unwrapped. The bundles were distributed among 5 sites and stored in the open, under sheds (closed or open at one side) or in unfinished houses (brick or

timber). Storage was for 6-10 weeks between 6 Oct. and 14 Dec. with weekly weighing. A record was kept of temperature and relative air humidity. Results (given in graphs and tables) show a very rapid recovery of m.c. in the material stored in the open, the m.c. of (1), (2) and (4) reaching 20-21% within 3 weeks. Recovery of m.c. of bundles stored in the houses and in sheds averaged 0.5-0.8% and 1.0% weekly, respectively. Recovery for (3) was very much less rapid, both in the open and indoors, than for the other classes. Conclusions are that softwood flooring should be kiln-dried to a m.c. representing equilibrium m.c. indoors and carefully protected during transport and storage at the site.

833.4. Special Uses in Agricultural Structures See No. 3513.

833.5. Wood in Bridges, Culverts etc.

3481. A new type of timber deck road bridge. *Aust. Timb. J.* 20 (10), 1954 (741-2).

To retain the more economic material and to discount the advantage of concrete with its more satisfactory surface, two types of wooden bridge are under government test in N.S.W. One has a saw-timber deck, the other uses round girders shaped on three sides. The pavement will be a bitumen-asphalt mix laid over a membrane polyvinyl-chloride sheeting to protect the timber from decay.

833.8. Wood in Hydraulic, River and Marine Uses

3482. AARON, J. R. The durability of timber in sea water. *Wood* 20 (2), 1955 (48-50). 8 refs.

General notes on the place of marine borers and fungi and abrasion in the life of timber in seaward defences. The work of marine fungi in facilitating invasion by griddles [*Limnoria*] and the effectiveness of creosote impregnation against these fungi requires special research.

834. Shingles. Cooperage. Packing Containers. (Manufacture and Use).

See also Nos. 3302, 3313-4, 3410.

3483. Western Red Cedar shingle roofs. *Repr. from F[ire] P[rotection] A[ssociation] Journal*, London No. 26 [1954?], pp. 6. 5 refs. P.R.

Tests have shown that the roof under investigation cannot be ignited by a small source of ignition, but that, when involved in a fire, it can distribute brands over a wide area.

3484. Es. Die technische Ausrüstung in der Kistenfabrikation. [Factory equipment for box manufacture.] *Holz-Zbl.* 81 (3/4), 1955 (17-20). [G.]

Illustrated description of the different machines and machine tools required.

3485. BIELCZYK, S. Uwagi nad metodyką badania wytrzymałości opakowań drewnianych. [Observations on methods of testing the strength of wooden containers.] *Sylvan* 98 (4), 1954 (332-44). 5 refs. [Pol.pol.]

Suggests criteria to define the strength of wooden containers: (a) relative (service) strength; (b)

absolute strength (strength coefficient); and (c) quality index. The criteria for (a) should be: the critical load for the compression test; critical number of shakings in the shaking test; critical number of falls in the drum test; mean dropping height in the drop test, and mean impact distance in the impact test; (b) is obtained by multiplying (a) by the gross weight of the container and dividing by its volume (in cu. dm.); (c) is obtained by dividing (b) by the total volume of wood used for the container (in cu. dm.).

3486. STERN, E. G. Strength of auto-nailer assembled skids of green and dry lumber. *Bull. Wood Res. Lab., Va. polyt. Inst.* No. 12, 1953. pp. 21 + [2]. P.R.
Cf. *For. Abstr.* 16 (No. 976).

835. Industrial and Domestic (Utility)
Woodware. Toys and Models. Sports
and Recreational Goods. Musical,
Scientific and Mathematical Instruments.
Surgical Applications etc.
See Nos. 3445, 3515, 3543.

838. Vehicles (including Ships, Boats, Aircraft) See also Nos. 3433, 3460.

3487. WOODS, R. P. Motor body work, suitability of new timbers—[summary of] lecture by T.D.A. scientific officer. *Timb. Tr. J.* 212 (4094), 1955 (93).

A score of species are mentioned.

3488. VENET, J. Le bois et les bateaux de guerre, de commerce et de plaisance. [Wood and warships, merchant vessels and pleasure boats.] *Rev. Bois Appl.* 10 (1), 1955 (17-24). 3 refs. [F.]

A brief outline of the history of wooden sea-going vessels from the earliest times is followed by a list of the present uses of wood for naval purposes and of the species involved: *Picea abies*, *Abies alba*, *Pinus sylvestris*, *Picea sitchensis*, *Pseudotsuga taxifolia*, 'Pitchpine', *Quercus robur*, *Fraxinus excelsior*, *Ulmus* sp., *Robinia pseudoacacia*, *Tectona grandis*, and 'Mahogany' species.

3489. Decay studies in wooden boats and ships. Division of Forest Pathology, U.S. Department of Agriculture, Washington, D.C. 1953. pp. 33 + 3 tbs. + 12 photos. 5 pp. of refs.

Analyses the results of an examination of 550 small boats, and on the basis of the findings makes recommendations on preservation and improvements in construction to ensure better ventilation. Decay losses were heaviest in boats stored on land, and recommendations are made for improving protection against rain.

839.2. Wood Flour and its Manufacture

3490. The manufacture of wood flour. *Aust. Timb. J.* 20 (12), 1955 (929...940, 979). 1 ref.

An illustrated account of the working of Australian Forest Products Pty. Ltd. mill, which barks free of cost the input of Radiata Pine for 4 sawmills in

return for the free issue of their offcuts and sawdust. General notes on uses and quality are included.

839.8. *Industrial Waste Wood, its Processing and Uses*

See also Nos. 3399, 3490, 3574, 3583-4, 3588, 3615.

3491. **Bacteria attack sawdust.** *Lumberm.* 82 (2), 1955 (66, 105).

An account of the patented waste-utilization methods of the Earp Laboratories, Hampton, New Jersey, at which cultures of 56 different strains of soil bacteria in special digesters rapidly break down sawdust into decomposition products for use on the land.

3492. HEDBACK, T. J. **Combined firing arrangements for waste fuels.** *Teknisk Tidskrift, Stockholm* 84 (24), 1954 (551-6). [Sw.] From *abstr. in Fuel Abstr.* 16 (6), 1954 (No. 5882). P.R.

A review of furnace requirements for dual firing of wood waste and coal; discusses optimum combustion conditions for each fuel, problems of slag formation and combustion losses, furnace design, and primary and secondary air supplies. Results are given for two 30 ton/hour wood/coal-fired boilers.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

841. *Wood Preservation*

See also Nos. 3316, 3449-52, 3482, 3489, 3518, 3521-3, 3531.

3493. GREATHOUSE, G. A., and WESSEL, C. J. [Editors]. **Deterioration of materials. Causes and preventive techniques.** Reinhold Publishing Corporation, New York. 1954. pp. xvii + 835. Many refs. P.R.

Three parts deal with wood: Part 1 covers important factors in deterioration (climate, chemical, physical and biological agents). Part 2 includes a section on wood and wood products (47 pp.) by G. M. Hunt. Part 4 deals with special aspects of preservation and includes a section on toxicological evaluation of preservatives (13 pp.) by W. C. Cox.

3494. NORÉN, B., and ELSER, T. **Impregnerat virkes svällning. [The swelling of preservative-treated wood.]** *Medd. svenska TräforsknInst. (Träteknik)* No. 58B, 1954. pp. 8 + 1 dgm. + 5 sets of gphs. [Sw.] P.R.

Pine and Spruce samples, 50 × 50 × 100 mm., were treated as follows (1) left untreated, (2) dipped in creosote, (3) pressure-impregnated with creosote, (4) pressure-impregnated with a 2% Boliden salt solution, or (5) brush-treated with 1 coat of linseed oil and 2 coats of varnish. Only Pine was given (3) and (4). After treatment, the samples were either kept under water or in a conditioning chamber at 20° C. and 100% relative humidity for up to 35 days; changes in weight and dimensions were measured at intervals. Results are given in graphs, showing the uptake of water and swelling for the 3 fibre directions, and the degree of swelling as a function of

time and of water uptake, for the different treatments. All treatments failed to prevent a considerable uptake of water over longer periods but treatment (5) reduced the swelling considerably over shorter periods, samples soaked in water taking over a week to reach the degree of swelling reached by samples given treatments (1) and (2) in 24 hours. This resistance to exposure to moisture for limited periods is a factor in reducing checks in wood and defects in the glue joint during service.

3495. SCHULZE, B., and GASDA, G. **Die Verdunstbarkeit von Holzschutzmitteln und ihre Prüfung. Grundlagen. Experimenteller Teil. [The vaporizability of wood preservatives and its testing. Fundamentals. Experimental part.]** *Holzforschung, Berlin* 8 (2; 3), 1954 (49-53; 78-87). 7 refs. [G.g.e.] P.R.

Discusses fully the part played by the vaporizability (rate of evaporation) of wood preservatives (I). Reproducible results can be obtained with the aid of a special apparatus designed by Wicht (*Wissenschaftliche Abhandlungen der deutschen Materialprüfungsanstalt (Ser. I) No. 5, 1940 (58-66)*). By employing suitable temperatures, pressures, and air humidities and velocities, it was possible to reduce the time of test to ca. $\frac{1}{10}$ of that in field tests. It was found that (I) depends on the depth of penetration of the preservative. For the determination of oily preservatives the magnitude 'vaporization value' (*Verdunstungszahl*) (II) was introduced, measured as loss in weight (mg./sq. dm.)/10 over a 180-hour period, at 20° C., 65% relative humidity, 1 m./sec. air velocity. When II is < 100, 100-400, and > 400, the preservatives are called sparingly, normally or easily vaporizable, respectively. The apparatus is not suitable for testing water-soluble vaporizable preservatives, since water evaporates almost completely during a short period of test. The following standard test was devised by one of the authors for oil preservatives: Pine sapwood blocks (DIN standard 2176) are fully impregnated and then subjected for 5 weeks to a test in the Wicht apparatus at 20° C., 65% humidity and 1 m./sec. air velocity; the 'vaporization value' is then determined. Although this method is very useful, an exact estimate of the durability of preservative effect can only be obtained from a biological test (DIN 52623, with *Anobium punctatum* larvae, and DIN DVM 2176 with cultures of *Coniophora cerebella* and *Lentinus lepideus*).

3496. RICHARDSON, N. A. **The development of coal tar creosote as a wood preservative. (Part two.)** *Wood* 20 (1), 1955 (16-7).

Gives a table of toxic limits by the woodblock test for 4-5 preservatives and 4 species of fungus. The fungi and 2 insect species are also listed against the creosote fractions most toxic to each.

3497. SCHULZE, B. **Zur Frage des Nachweises der Fluorverbindungen im praktischen Holzschutz. [On the detection of fluorine compounds in wood preservation practice.]** *Holz Roh- u. Werkstoff* 12 (8), 1954 (320-4). 12 refs. [G.g.] P.R.

The Zr-alizarin test for fluorides can be used to determine depth of penetration. The disadvantages of this test in quantitative F determination are

eliminated by the volumetric method of Willard and Winter. [Cf. *For. Abstr.* 15 (Nos. 809, 1930-1, 1961).]

3498. SANDERMANN, W., JONAS, G.-Z., and STOCKMANN, H. Über den Chemismus der Fixierung von U- und UA-Salzen. [Chemical nature of the fixation of preservative salts resistant to leaching, with and without As content.] *Holz Roh- u. Werkstoff* 12 (8), 1954 (324-6). 2 refs. [G.g.] P.R.

The fixation of these preservatives consists in (1) reduction of the dichromate to chromous compounds, and (2) formation of sparingly soluble chromous salts. It was shown that the reduction is due almost exclusively to the phenolic groups of lignin. The sparingly soluble salts formed belong to the type $\text{Me}_2[\text{CrF}_6(\text{H}_2\text{O})]$, where Me is a univalent metal.

3499. SWAAY, H. G. J. A. VAN. Werkwijze ter bereiding van middelen voor het conserveren van hout, en aldus geconserveerde houten voortbrengsels. [Method of preparing wood preservatives and the products of wood thus preserved.] *Netherlands Patent* No. 75,188, 15 July, 1954. pp. 2. [Du.] P.O.

The preservative contains dinitrophenol, a fluoride and/or an arsenate and/or a chromate, to which are added one or more acid compounds (e.g. oxalic acid) so as to adjust the pH of aqueous solution below 6, and one or more corrosion inhibitors, e.g. oxyquinoline sulphate.

3500. DAIMLER, K., and LORENZ, V. (to Farbwerke Hoechst.) Holzschutzmittel. [Wood preservatives.] *German Patent* No. 883,335, July 16, 1953. pp. 2. [G.] P.O.

Water-soluble salts of the amidosulphonic and/or iminodisulphonic acids, and rhodanides, with other substances.

3501. HATFIELD, I. Solvent type preservatives. *Prepr. Conv. Brit. Wood Pres. Ass.* 1954, No. 3, 1954. pp. 20. 29 refs. P.R.

Solvent-type preservatives have been going through a 'proving' period for ca. 20 years, and their usefulness in different fields is fairly well established. The toxicity, different properties and methods of application are described and tabulated.

3502. HINTZMANN, K., SEIBERT, H., and SCHNELL, H. (to Farbenfabriken Bayer) Holzimprägnierungsmittel. [Wood preservatives.] *German Patent* No. 883,803, July 20, 1953. pp. 2. [G.] P.O.

Wax-like reaction products obtained from polyhydric alcohols and alkylene oxide.

3503. KRUEDENER, H. J. VON. Verfahren und Vorrichtung zur Imprägnierung von Holz und Holzbauteilen. [Method and plant for the impregnation of wood and structural timber.] *German Patent* No. 882,001, July 6, 1953. pp. 2. [G.] P.O.

Toxic gases or air are used under low pressures together with a liquid impregnant, the gases being led into the wood either at right angles to the impregnant, or along with it as a spray.

3504. SCHELAMEUR, P. Verfahren und Vorrichtung zur Tränkung von Holzigen Stoffen. [Method and plant for the impregnation of woody materials.] *German Patent* No. 889,834, Sept. 14, 1953. pp. 4 + 1 dgm. [G.] P.O.

In a pressure system, the pressure is generated by raising the temperature of the liquid impregnant.

3505. KOLJO, B. The dependence of the absorption of preservatives by wood on various factors, with special reference to Pine and Spruce. *Transl. For. Prod. Lab., Can.* No. 80, 1954. pp. 15. Transl. from *Holz Roh- u. Werkstoff* 11 (8), 1953 (303-11). [See *For. Abstr.* 15 (No. 1916).] Limited distribution. P.R.

3506. KOLJO, B. Influence of the methods of impregnation on the absorption of preservatives in wood impregnation. *Transl. For. Prod. Lab., Can.* No. 78, 1954. pp. 19. Transl. from *Holz Roh- u. Werkstoff* 12 (1), 1954 (7-16). [See *For. Abstr.* 15 (No. 4239).] Limited distribution. P.R.

3507. NEVARD, E. H. Requirements and variations in pressure treatment. *Prepr. Conv. Brit. Wood Pres. Ass.* 1954, No. 7, 1954. pp. 12. P.R.

Discusses different factors contributing to adequate impregnation of different woods with different preservatives and different methods; after briefly mentioning incision and pre-steaming practices, the author discusses in more detail the effect of initial vacuum, pressure and final vacuum. With an adequate initial vacuum, the absorption within 10 min. of applying pressure was found to be at least 3 times that obtained in the same time without vacuum. The full-cell method with initial vacuum is suitable for both permeable and resistant timbers, while the Lowry and Rueping methods (without initial vacuum) can only be applied with some success to permeable timbers. For low pressures (ca. 50 lb./sq. in.), absorption shows hardly any correlation with the duration of the initial vacuum; for higher pressures (150-200 lb./sq. in.), the absorption increases both with the pressure applied and the degree of initial vacuum used. The rationalization of the treatment plant is discussed.

3508. THEDEN, G., and GERSONDE, M. Streichen und Sprühen von Holzschutzmitteln. [Brushing and spraying of wood preservatives.] *Holz-Zbl.* 81 (27), 1955 (332-3). 3 refs. [G.g.]

Describes the results of practical tests made at the Federal Institute for Mechanical and Chemical Testing of Materials, Berlin-Dahlem, to find correlations between the uptake (U) and penetration depth (PD) on the one side and different properties and factors on the other. The relationship between the quantity of preservative used and U is not clear; U is affected considerably by surface finish and position of the board: it is greater for a coarse surface than for a smooth one, and for a horizontal board (treated from above) than for a vertical one. Differences between the individual preservative solutions (even in different solvents) are very small. No difference could be found between Pine and Spruce test pieces. PD depends much less than U on the quantity of preservative, surface finish and position. Oily preservatives penetrate very little, if at all, into Spruce, and still less into Pine, heartwood; aqueous solutions also show less penetration into heartwood than sapwood. PD depends to a large degree on the nature of the preservative. High moisture content inhibits the penetration of oily, and promotes that of aqueous, preservatives.

3509. **Preservation of timber by the steeping process.** *Rep. U.S. For. Prod. Lab., Madison No. 621, (rev.) 1954.* pp. 10 + 2 tbls. P.R.

Cf. *For. Abstr.* 8 (No. 488).

3510. MCNEAL, X. **Tests of fence post preservatives.** *Bull. Ark. agric. Exp. Sta. No. 519, 1952.* pp. 23.

Tests were begun in 1935 on 1584 Pine [species not stated] fence posts given several different treatments. The data up to 1951 are recorded and summarized. The three most effective treatments were: (1) pressure creosote (commercial); (2) ZnCl_2 $7\frac{1}{2}\%$ and spent crankcase oil; heated 1 hour/in. of thickness in ZnCl_2 , cooled overnight in the solution and dried for 48 hours, heated 2 hours/in. thickness in oil, and cooled overnight; (3) a 50 : 50 mixture of coal-tar creosote and spent crankcase oil, heated for 2 hours/in. of thickness. Both (2) and (3) can be carried out on the farm with farm-built equipment. After $15\frac{1}{2}$ years of service, 83% of posts given treatment (2) and 81% given (3), remained. Only 3% of controls remained after 12 years. Heartwood and fast-grown wood responded most favourably to (2), sapwood, intermediate wood, and slow-grown wood to (3).

3511. MARSHALL, E. D. **Cold-soaking Loblolly and Shortleaf Pine fence posts with pentachlorophenol.** *Tech. Rep. Tex. For. Serv No. 6, 1952.* pp. 35. 12 refs.

Pinus taeda and *P. echinata* posts of 2-5-3-5 in. top diameter and 6-5 ft. long were cut, peeled, open-piled for air seasoning for different periods, and then soaked, butt down, in vertical tanks containing a cold 5% solution of pentachlorophenol in fuel oil. Posts seasoned for 1, 4, and 6 months, and cold-soaked for 3 days, showed complete penetration of the sapwood at the butt end, retaining 5-6 lb. of preservative per cu. ft. of wood. The method of seasoning is believed to be the key to this good result. The effects of species, sp. gr., age, m.c., temperature, compression wood, and incising, on penetration and retention, are discussed.

3512. THOMPSON, W. S. **Fence post preservation with copper naphthenate by the cold soaking method.** *Circ. Miss. agric. Exp. Sta. No. 191, 1953.* pp. 8.

The results to date of experimental work indicate that cold soaking in Cu naphthenate and fuel oil (1 : 10 by volume) is a satisfactory preservative treatment for fence posts of Mississippi species. Assuming a service life of 15 years, treated posts cost $2\frac{1}{2}$ cents/p.a. compared with 10 cents for untreated.

3513. KAUFERT, F. H., and LOERCH, K. A. **Treated lumber for greenhouse use.** *Minn. For. Note No. 36, 1955.* pp. 2.

Of the preservatives tested, only Cu naphthenate and Erdalith (composition not stated) appeared to be sufficiently free from injurious effects on the test plant (tomato) to permit their use for greenhouse flats or benches. Pine sapwood treated with Cu naphthenate appeared to have the same service life as untreated Cypress heartwood.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

3514. Hsu, H. W. [Test on the impregnation of nine important species of wood in Taiwan [Formosa] (1).] *Bull. Taiwan For. Res. Inst. No. 33, 1952.* pp. 18 + 1 tbl. [Chin.chin.e.]

Describes the results of different tests (penetration rate and amount of resin absorbed, shrinkage, strength properties) conducted with specimens of several Formosan species, impregnated with a phenol-formaldehyde synthetic resin which was then polymerized by heating.

3515. KAWASAKI, M. **Wooden bearings for use in water.** *Japanese Patent No. 2096 ('54), April 21, [1954].* pp. 1. [Jap.] From *abstr. in Chem. Abstr.* 49 (3), 1955 (2072). P.R.

Wood is immersed for 1 hour in a molten mixture consisting of equal weights of S and $\text{ClC}_{10}\text{H}_7$ [monochloronaphthalene].

3516. BEERMANN, W. **Verfahren zur Neutralisierung für Formstücke aus Holz. [Method of dimensional stabilization for wood blanks.]** *German Patent No. 883,334, July 16, 1953.* pp. 2. [G.] P.O.

Blanks are immersed in a bath of easily fusible metals (just above 140°C .), until the wood is completely dried.

3517. ERICKSON, E. C. O. **Mechanical properties of laminated modified wood.** *Rep. U.S. For. Prod. Lab., Madison No. R1639 (rev.) 1952.* pp. 16 + 3 photos + 1 dgm. + 5 gphs. + 9 tbls. 8 refs. P.R. Cf. *For. Abstr.* 9 (No. 2369).

843. *Fireproofing and Fire Resistance*

See also No. 3361.

3518. HANAOKA, T. **Preservative fireproofing agent for wood.** *Japanese Patent No. 2095 ('54), April 19 [1954].* pp. 1. [Jap.] From *abstr. in Chem. Abstr.* 49 (3), 1955 (2013). P.R.

A solution of Na silicate and NaBO_3 is treated with Pb acetate, $\text{K}_2\text{Cr}_2\text{O}_7$, and H_3AsO_4 , and the clear yellow solution obtained is applied to wood.

3519. STUMPP, K., and HUBER, H. (to Chemische Werke Albert). **Flammschutzmittel für Pappe, Faserplatten u. dgl. [Fireproofing agents for roofing felt, fibreboards and the like.]** *German Patent No. 888,355, Aug. 31, 1953.* pp. 2. [G.] P.O.

Use of NH_4 metaphosphate.

844. *Attack by Plant Organisms*

See also No. 3127.

3520. GRAM, K., and JØRGENSEN, E. **An easy, rapid and efficient method of counter-staining plant tissues and hyphae in wood sections by means of fast green or light green and safranin.** *Friesia, København* 4 (4/5), 1952/53 (262-6). 5 refs. [E.] [Royal Veterinary and Agricultural College, Copenhagen.] L.S.

The method, which the authors claim to be easy, quick and almost infallible, involves the following procedure: 0.5 g. fast green FCF (or light green SF) and 1.5 g. safranin O are dissolved by shaking in 200 ml. 60% alcohol; 2 drops conc. HCl are then added. The solution should have a dark violet colour and turbid aspect; it may be used immediately, but will be more efficient if kept for a day or two, and will keep for years. Wood sections may be cut

in several ways, but the authors prefer to put the dry wood pieces in ca. 96% alcohol and to place the container in a vacuum for some minutes so as to eliminate air from the tissues. After this the wood may simply be put into water for a short time and kept wet while the sections are cut. The alcohol in the tissues will be replaced by water more quickly, however, if the specimens are again subjected to a vacuum. The water content of these sections must not be too high. The section is then placed in a few ml. of dye solution for 3 min. or more (a watch-glass is convenient), after which it is transferred with a clean dry needle to another watch-glass containing absolute alcohol, and is stirred with the needle. This immersion is repeated with fresh alcohol each time until no more red colour is extracted from the section; usually 3 changes of alcohol suffice. If the section is to be mounted in Euparal, it may be transferred directly from the absolute alcohol. If Dammar balsam or Canada balsam is to be used, the section is first immersed in xylol. The following colours are obtained: Red: lignified walls, resins and (if acid is omitted from the dye solution) nuclei. Greenish-blue (or green if light green is used): cellulose, protoplasm and hyphae. Uncoloured: cuticula, periderm without lignin, and crystals. Mixed colour: too thick sections and (if acid is omitted from the dye solution) tannin and allied substances. A list is presented of mycelia and woods stained in this way.

844.1. Sap-staining and Mould Fungi

3521. MATHIEU, H. Le bleuissement des résineux. [Bluestain of coniferous woods.] *Bois et Sciéries* 61 (2; 4), 1955 (42-7; 107-8). [F.]

Describes methods of prevention (1) by chemical treatment, (2) by proper piling and ventilation.

3522. KRAMER, P. R. Results of spraying Pine and hardwood logs for control of insects and stain. *Tech. Rep. Tex. For. Serv.* No. 9, 1954. pp. 18.

A study was made to determine the effectiveness of log spraying to prevent insect attack and stain damage in Pine and hardwood logs stored for periods of 4 and 6 months. The project was carried out at three separate commercial operations, normal mill practice being followed in each case. Damage was computed by measuring holes and stain on lumber recovered after milling. The results indicate that BHC and pentachlorophenol in oil solution applied as a log spray is completely effective in preventing insect attack on both Pine and hardwood logs for storage periods as long as 6 months. The occurrence of stain was found to be somewhat erratic. About 15% of all Pine and hardwood lumber stained after log storage of 4 months. A slightly larger % stained after 6 months. A limited volume of unsprayed control logs left in storage for 6 months showed from three to four times the amount of stain in sprayed logs. Over 600,000 bd. ft. of logs were sprayed with an average spray consumption of 3.58 gal./1000 bd. ft. and at a computed total cost of \$1.80/1000 bd. ft. net log scale (International 1/4-in. Log Rule). Log spraying during periods favourable to insect attack and stain development is recommended. *From author's summary.*

3523. ORMAN, H. R. The relative efficacy of certain chemical dip treatments in preventing sap stain in *Pinus radiata*. *Aust. Timb. J.* 20 (11), 1954 (831...835, 901...905). 9 refs.

Production of this Pine has outstripped kiln- and air-seasoning capacity, and unseasoned timber is being close stacked (wharves, ships' holds). The best of 9 dip treatments for green timber close stacked for 3 months or more, were solutions of Na pentachlorophenate (0.4%) in mixtures with $\text{Na}_2\text{B}_2\text{O}_7$ (1.2%) or with $\text{Na}_2\text{B}_4\text{O}_7$ (1.2%) and EtHgCl (0.1%) or with Na trichlorophenate (0.3%). Winter-stacked timber suffered least from stain.

844.2. Wood-destroying Fungi

See also Nos. 2701, 3129-39, 3214, 3482, 3489.

3524. FINDLAY, W. P. K. Physiology of wood-destroying fungi. *Prepr. Conv. Brit. Wood Pres. Ass.* 1954, No. 5, 1954. pp. 9. 3 refs. P.R.

Describes the nutrition, respiration, moisture requirements, temperature relations, influence of radiation on growth, and metabolic products of the wood-rotting fungi (brown and white rot), and the physiology of fungi causing 'soft rot'.

3525. VLIET, W. F. VAN. The enzymic oxidation of lignin. *Biochim. biophys. Acta* 15 (2), 1955 (211-6). 11 refs. [E.c.f.g.] O.R.S.

The white-rot fungi *Poria subacida* and *Polystictus versicolor* grew very well on an inorganic medium with a suspension of Brauns lignin, isolated from Birch decayed by a brown-rot fungus as the sole source of C. Enzymic oxidation of phenolic substances, of Brauns lignin, and of alcohol lignin was obtained with a preparation from mushroom spawn and with culture filtrates of *P. versicolor* grown on a lignin-free medium. *From author's summary.*

3526. ZOBERST, W. Die physiologischen Bedingungen der Pigmentbildung vom *Merulius lacrymans domesticus* Falck. [Physiological conditions for pigment formation in *M. lacrymans domesticus*.] *Archiv für Mikrobiologie, Berlin* 18, 1952 (1-31). 82 refs. [G.g.] L.S.

3527. KÜHLWEIN, H., and ZOBERST, W. Zur Frage des Wuchsstoffbedarfes und der Wuchsstoffsynthese von *Merulius lacrymans domesticus* Falck. [Requirement for and synthesis of growth substance in *M. lacrymans domesticus*.] *Archiv für Mikrobiologie, Berlin* 18, 1952/1953 (273-88). 51 refs. [G.g.] L.S.

M. lacrymans is shown to require aneurin for growth. Other (not identified) growth substances are discussed. The synthesis of yeast-active substances has been investigated.

3528. HARMSSEN, L. *Merulius tignicola* sp. nov. og dens forekomst i Danmark. [*M. tignicola* sp. nov., a new wood-destroying fungus in Denmark.] *Friestia, København* 4 (4/5), 1952/53 (243-56). 16 refs. [Dan.e.] L.S.

Describes the new species [cf. *For. Abstr.* 14 (No. 3886)] and gives points of difference from *M. lacrymans*. *M. tignicola* requires wood with a rather high moisture content. Growth is slow, but the wood becomes badly affected. In experiments, Norway Spruce lost up to 31% in weight in 20

weeks, and 41% in 10 months. The hyphae in the wood are delicate, with numerous clamp connections, and often with crystals. The fungus prefers coniferous wood, and has only once been found on Oak. A map shows its distribution in Denmark. *From author's summary.*

3529. BAGCHEE, K., and BAKSHI, B. K. *Studies on Indian Thelephoraceae. 1. Some species of Stereum, Peniophora, and Corticium.* *Indian For. Bull. (n.s.)* No. 166, 1954. pp. 12 + 7 photos.

3530. MULHOLLAND, J. R. *Changes in weight and strength of Sitka Spruce associated with decay by a brown-rot fungus, Poria monticola.* *J. For. Prod. Res. Soc.* 4 (6), 1954 (410-6). 23 refs.

Tests were made on 100 specimens $4\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ in. from a single piece of air-dry Sitka of medium density. They were end-coated with resin, conditioned at 40° C. for 5 days, weighed, and then exposed to *P. monticola* for 2-14 days. At the end of each exposure period they were examined, conditioned at 40° for 5 days, weighed, and conditioned to a uniform equilibrium m.c. over NaNO_2 . They were then tested for loss of strength in static bending. Results, given in graphs and tables, show change in weight, in equilibrium m.c., and in strength values at different periods. After 6 days' exposure, there was a highly significant increase in equilibrium m.c. Total weight loss at the end of 2 weeks averaged 2.03% of the dry weight. At this time, the equilibrium m.c. of the test specimens over NaNO_2 showed an increase of 11.5% over that of controls. No significant losses were found in fibre stress at proportional limit, modulus of elasticity, or work to proportional limit, but losses of 26% in work to maximum load, and 13% in modulus of rupture were noted after 14 days. This highly significant loss in strength with a weight loss of only ca. 2% indicates the importance of very small weight losses caused by brown rot, and the danger of too broad a durability classification for wood to be used in places where strength is important.

3531. MATEUS, T. J. E. *Characterization of wood preservatives with the aid of a new method based on the measurement of deflections.* *Transl. For. Prod. Lab., Can.* No. 81, 1954. pp. 24. 18 refs. Transl. from *Publicação, Laboratório Nacional de Engenharia Civil, Lisboa* No. 48, 1954 [see *For. Abstr.* 16 (No. 2373)]. Limited distribution.

3532. ENGLERTH, G. H., and SCHEFFER, T. C. *Tests of decay resistance of four Western pole species.* *Rep. U.S. For. Prod. Lab., Madison* No. 2006, 1954. pp. 8 + 1 photo + 1 dgm. + 2 tpls. 5 refs. P.R.

Accelerated decay tests were made on heartwood (h.w.) samples from pole-size trees of Western Red Cedar, Western Larch, Douglas Fir, and Lodgepole Pine. Two general classes of decay resistance were indicated: resistant, represented by the Red Cedar from the lower and middle thirds of the pole, and moderately resistant, represented by the Red Cedar from the upper part of the pole and by the other woods from all parts of the pole. Among species other than Red Cedar, Larch tended to be most resistant and Lodgepole Pine least resistant, but

these differences usually were not large nor were they consistent in all tests. Differences in sapwood (s.w.) thickness and tendency to check would also be important factors in determining how these species would perform as poles. There were marked radial as well as vertical differences in the resistance of Red Cedar, the outer h.w. being most resistant and the inner h.w. least. Differences of the same type, but of lesser magnitude, occurred in Larch. There was no apparent relation between decay resistance and the growing site or the age or size of the tree in any of the woods. Decay resistance was plainly correlated with specific gravity in Larch but not with that of other species. Internal s.w. content present in several Red Cedar and Larch trees was no more resistant to decay than normal s.w. The interior decay resistance of a pole containing internal s.w. would, therefore, be less than that of a pole without it. *From authors' summary.*

3533. WRIGHT, E. *A preliminary study of the deterioration of Alder and Douglas-Fir chips in outdoor piles.* *Res. Note Pacif. Northwest. For. Range Exp. Sta.* No. 99, 1954. pp. 5.

In a pilot test, lasting 1 year, of a pile containing $\frac{2}{3}$ Alder and $\frac{1}{3}$ Douglas, deterioration of Alder chips was slowed down without increasing the decay in Douglas Fir for the test period. A pile containing 90% Douglas Fir and 10% Alder showed no decay during the test. This test is not considered conclusive.

845. Attack by Animals

845.1. Marine Borers

See also No. 3482.

3534. *Vergelijkend onderzoek naar de duurzaamheid tegen paalworm van tropisch hout in Nederland, vijftiende verslag. [Comparative investigations on the resistance to marine borer attack of tropical woods in the Netherlands: fifteenth report.] Meded. Inst. Trop. Amst.* No. 106 (*Afd. trop. Prod.* No. 40), 1954 (32-5, 67-8). [Due.]

A progress report, including a list of 8 Surinam timbers added to the experiment, with their SiO_2 content.

845.2. Terrestrial Borers

See also No. 3522.

3535. BLETCHLY, J. D. *A little-known borer in imported softwood; Serropalpus barbatus Schall. (Coleoptera, Melandryidae). Review of literature and recent occurrences in Great Britain.* *Forestry* 28 (1), 1955 (67-72). 19 refs.

845.3. Termites

3536. HARRIS, W. V. *Termites in Europe.* *Ent. mon. Mag.* 90 (1084), 1954 (194-7). 7 refs.

Notes on the biology of the 3 European species, *Kaloterms flavicollis*, *Reticulitermes lucifugus*, and *R. flavipes*, with remarks on casual occurrences of imported termites in England and on the maintenance of colonies in laboratories.

846. Steaming

See No. 3441.

847. *Drying (Seasoning)*

See also Nos. 3049, 3080, 3373, 3464-8.

3537. CLAUSEN, V. H. *Air seasoning Californian Redwood*. *J. For.* 52 (12), 1954 (933-5).

Speed of drying and lumber dried/acre/year are important factors in cost. By placing < half the former amount on each acre it has been shown that > half the time is saved and costs proportionately reduced. Most of the 230-300 million feet of Redwood annually air-dried is now stacked at 5- to 8-ft. spacing. A diagram shows, in elevation, lines of equal m.c. at 270 days through stacks spaced 4, 6 and 8 ft., and curves are drawn for m.c. for each of these spacings against drying time and cost.

3538. BAKER, G., and McMILLEN, J. M. *Seasoning Beech lumber*. *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 11, 1955. pp. 22. 8 refs.

Seasoning characteristics, and recommendations on air and kiln drying and on chemical seasoning.

3539. KOLLMANN, F. *Neuere deutsch-schwedische Beiträge zur Physik der Holz Trocknung*. [New German-Swedish contributions to the physics of wood seasoning.] *Holz Roh- u. Werkstoff* 12 (6), 1954 (213-23). 5 refs. [G.] P.R.

Describes in detail two experimental drying kilns used by the author in the Swedish Wood Research Institute for his investigations since 1949. Kiln No. 1 (ca. 1 m. cube) is equipped with an internal fan, psychrometers at the inlet and exit vents, and a device for precision dosage of steam. The wood dried can be weighed during the seasoning process without removing it from the kiln. The heating is electric. In kiln No. 2 the drying agent (steam/air, or superheated steam with or without air) is circulated through the kiln, which forms a portion of a circuit comprising a blower. The kilns contain devices for measuring and controlling the temperature, air humidity and velocity of the drying medium. One of the quite novel features is the apparatus for automatic weighing, on barometrical principles, which enables the moisture content (m.c.) of the wood load to be recorded automatically in the form of a curve. (A description of the apparatus, designed by L. Malmquist, is to appear shortly.) A special instrument has been constructed for determining the absorption of radiant energy by wood. The summarized results of investigations to date are as follows:

Three types of drying can be distinguished so far as the influence of drying conditions on rate of drying is concerned: (1) during the 'capillary' drying of very wet wood the rate of drying $\frac{\partial u}{\partial \tau} = C$

(= $C\phi^0$), where u = m.c., τ = time, ϕ = relative air humidity (r.h.), and C is a constant; it is claimed that, provided ϕ is low enough to ensure the removal of moisture from the surface layer of wood, the rate of drying does not depend on ϕ [but on moisture movement through capillary channels?]; (2) during ideal and undisturbed [equilibrium] diffusion-type drying, the rate, m.c. and, consequently, the r.h., all vary in the same sense, hence $\frac{\partial u}{\partial \tau} = C\phi^1$, while (3),

in practice, when the drying process is disturbed by 'impulses' (stepwise changes of r.h. and temperature), $\frac{\partial u}{\partial \tau} = C\phi^{-1}$.

The results of temperature measurements with multi-point thermo-couple temperature recorders show, *inter alia*, that (1) when the temperature of the circulating medium was ca. 150° C., that on the inside of the very well insulated kiln walls was 10-12° lower; (2) whereas a temperature of ca. 97° was reached very quickly (10 min.) by all parts of a board 45 cm. long and 2.5 cm. thick, 100° was reached by its front end in ca. 40 min., and by its rear end only in 80 min.; the fibre-saturation point was attained after 240 min. when the temperature of the board was 102-103°; (3) thereafter, the temperature rose rapidly, the rate of rise at the front end, being at first lowest, but after ca. 40 min., highest; (4) even after 520 min., when the front end assumed the temperature of the heating medium, the rear end was ca. 10° cooler. Investigation of temperature variation inside a board showed that, while 103° (corresponding to the fibre-saturation point in this case) was reached by points just inside the surface layer in ca. 100 min., the inside of the board was still at ca. 100° with mean m.c. of ca. 80%. For some 180-280 min., a high temperature divergence obtained, reaching 20°; later the temperatures converged, finally reaching a temperature 3.5° lower than that of the medium.

An investigation of conditions in the boundary layer by the *schlieren*-optical method has been conducted at the Institute.

Finally, strength tests were conducted on Oak, to determine the effect of various drying factors on cracks (internal and external), deformation (including cell collapse), discoloration, falling-out of knots, and, in the case of conifers, also resin exudation. H.F. fields were used for rapid heating of the test-pieces, and the relationship between temperature and strength properties was determined. It was also found that the drying time for Oak was $\tau \propto t^{3-38}$, compared with $\tau \propto t$ found previously for [coniferous?] converted wood.

3540. KOLLMANN, F. *Recent German-Swedish contributions to physics of lumber seasoning*. *Transl. For. Prod. Lab., Can.* No. 82, 1954. pp. 18. Transl. from *Holz Roh- u. Werkstoff* 12 (6), 1954 (213-23). [See preceding abstract.] Limited distribution.

3541. KIRILLOV, N. M. *Grafoanalitičeskii rasčet režimov termičeskoj obrabotki drevesiny prjamougoljnogo sčeniija*. [Graphical calculation of heat-treatment schedules for timber of rectangular cross-section.] *Derev. lesohim. Prom.* 3 (11), 1954 (16-9). [Russ.] P.R.

Mathematical expressions and a nomogram are developed for determining the duration of heating of sawn timber, when the following data are available: initial and final temperature difference between timber and heating medium; position of the place at which the final timber temperature is determined; least dimension of timber, and coefficient of temperature conductivity of the wood (a table of coefficients for Oak, Pine and Birch is included).

3542. ANDERSSON, R. Några undersökningsresultat från en rökgasvärmad virkestork. [Some results of experiments on a kiln heated by flue gases.] *Medd. svenska TräforsknInst. (trätekn. Avd.)* No. 61B, 1954. pp. 21. [Sw.] P.R.

A more detailed account of the methods and experiments already described [see *For. Abstr.* 16 (No. 2406)].

3543. HOLLAND, F. Radio frequency drying of Birch stock for broom heads. *Wood* 20 (3), 1955 (86-9). 5 refs.

Cost of installation (in a Sussex factory, U.K.) was £1500 and of running 5s./hour at 1d./unit, including 25,000 hours' depreciation. Generator output is 10 KW at 19.5 megacycles/sec. Each log (2 broom heads) costs 2d. to dry and takes one hour to be conveyed through the electrode system; during which moisture is reduced from 95 to 32-38% at ca. 2.2 lb. water/KWH. The electrical and mechanical lay-out is illustrated.

3544. TERAZAWA, S., and IWASHITA, M. [Data on high-frequency drying of wood.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 68, 1954 (229-43). 17 refs. [Jap.jap.]

A detailed study of the operational costs of a Forest Products Co-operative H.F. drying plant, using 2- to 3-months air-dried *Fagus crenata* flooring planks and several drying schedules. Monthly costs are analysed and tabulated per unit outturn (koku).

3545. CHUDNOFF, M. Preventing collapse during seasoning.] *Hayaar* No. 4, 1955 (76-9, x). [Heb.e.] Impregnation of *Eucalyptus rostrata* sapwood with a 0.1 N solution of HCl reduces tangential collapse from 11.8 to 4.4%. A 1.5 N solution of NaCl reduces total collapse to 5%.

848. *Timberyard Practice. Handling and Storage of Timber*

See also No. 3480.

3546. Timber handling equipment. *Wood* 20 (3), 1955 (108).

Describes briefly, with illustrations, a mobile crane (Coles Mk. 7 Series 7) for handling a prefabricated bow-string truss, the Rapier Super fork-lift truck, a hydraulically-operated lift-tong attachment to the Allis-Chalmers tractor, the Timber Wolf straddle carrier [cf. *For. Abstr.* 14 (No. 937)] and the County Fourdrive tractor.

849. *Miscellaneous*

3547. HAMANN, K., and WILLEMS, J. Verfahren zur Bekämpfung des Verstockens von Laubhölzern, insbesondere von Rotbuchenstammholz. [Method of controlling tylose formation in broadleaved wood, in particular of Beech stemwood.] *Swiss Patent* No. 279,701, March 17, 1952. pp. 2. [G.] P.O.

Wood is treated with a reducing agent and then coated with an airtight film.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 3291, 3359, 3414, 3446, 3547.

3548. POLETIKA, N. V. Slope of grain in engineered wood. *J. For. Prod. Res. Soc.* 4 (6), 1954 (401-3). 7 refs.

Discusses briefly methods of measurement and slope of grain in relation to the physical (reaction to heat, insulation of heat and sound) and mechanical properties of wood, and to dimensional change, and stresses the need for further research.

3549. EADES, H. W., and ALEXANDER, J. B. Streaky red heart in Douglas Fir: its significance in relation to incipient decay and strength properties. *Bull. For. Br. Can.* No. 113, 1954. pp. 16 + 2 plates. 6 refs.

It is concluded, from microscopic studies, mechanical strength tests, and chemical analysis that streaky red heart of Douglas Fir does not *per se* indicate decay, can be distinguished from incipient decay, and is not appreciably weaker than unstreaked wood. There is some indication that the condition is due to tannin derivatives.

3550. KÜHNE, H. Über die Festigkeits- und Verformungseigenschaften des braunen Kernholzes der Esche. [The strength properties and deformation of black heartwood of Ash.] *Schweiz. Z. Forstw.* 105 (12), 1954 (733-45). 5 refs. [G.g.f.]

Studies of modulus of elasticity, bending strength and impact testing of Ash showed that there was no inferiority in these properties in black heartwood compared with normal white heartwood. [Cf. *For. Abstr.* 13 (No. 4176).]

3551. Compression wood in pulpwood. Tappi Tentative Standard T 20 m-55. *Tappi* 38 (1), 1955 (174A-176A). 4 refs. P.R.

A method for detecting and measuring compression wood that is recognizable by the naked eye; requires a viewing device, a ground-glass tracing plate or table, and a planimeter.

3552. YRJÖNEN, E., and CRANDALL, L. W. Sawmills in Finland use new-type metal detectors. *Sth. Lumberm.* 189 (2369), 1954 (248 ... 252).

Cf. *For. Abstr.* 15 (No. 3035).

3553. ISAKA, S., and UMEHARA, M. [Distortion of wood, in particular the warping deflection of flat-sawn *Fagus crenata* boards during seasoning.] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 71, 1954 (121-36). 7 refs. [Jap.e.]

A study carried out on 47 pieces, 6 × 6 cm., cut from a single log, of the distortion due to annual rings, with 17 formulae relating it to radial and tangential shrinkage, distance from log centre and width of board. Table headings, figure descriptions and formulae are given in English and the summary includes formulae covering shrinkage, (*s*), at any angle with the annual ring; sum of *s*% at right angles; angles of distortion in movement from square to rhomboid cross-section; mean *s*% of all boards in the log; warping deflection and the special case of *s* near the log centre.

853. *Grading of Wood in the Rough*

3554. KRAMER, P. R. Log grade classification based on standard lumber recovery for inferior upland hardwoods in East Texas. *Tech. Rep. Tex. For. Serv.* No. 4, 1952. pp. 34.

854. *Grading of Converted Timber*

See also Nos. 3449-53, 3477-8.

3555. *Interim grading rules for Radiata Pine sawn and milled products. Inter. Specif. Stand. Ass. Aust.* No. 371-5, 1954. pp. 28. Price 5s. P.R.

3556. THUNELL, B. Virkesutbytet vid några provsorteringar samt betydelsen av de kvalitetsbestämmande faktorerna härvid. [Timber yields from some grading experiments and the influence of factors determining quality.] *Medd. svenska Trä-forsknInst. (trätekn. Avd.)* No. 56 B, 1954. pp. 10 + 28 tbls. + 6 gphs. [Sw.] P.R.

A total of 15,311 pieces, 7377 of Pine and 7934 of Spruce, in 16 and 21 dimension classes respectively, from 13 frame-saw mills and one circular-saw mill, were graded into the normal quality grades I-VI for general uses and cabinet making etc. where appearance is of primary importance, and into the stress grades T100 and T70 for structural uses. Tabulated results show for the two species: % yields by dimension classes in the different quality and stress grades; the % yield of the two stress grades obtained from the material sorted into each quality grade; % yield of stress grades from the different sawmills; length distribution in the different quality and stress grades; distribution of defects in the different quality grades; knot types, annual ring width and latewood % in the T grades; and distribution of knots (by diameter classes) for material of different thicknesses.

86. PULP INDUSTRIES. COMPOSITE MATERIALS MADE WHOLLY OR PARTLY OF WOODY MATTER. CHEMICAL UTILIZATION OF WOOD

See also section 813.

861. *Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives*

See also Nos. 3031, 3309-12, 3351, 3397-8,
3402, 3533, 3582.

3557. *Pulpwood from small woodlands. Bull. Ntheast. Wood Utiliz. Coun.* No. 40, 1953. pp. 77. 9 refs. Price \$2.00. P.R.

Report on a 1952 conference sponsored by the Northeast Wood Utilization council, containing papers on: (1) Integrated logging: the key to stand improvement (*H. I. Baldwin*); (2) What will the pulp mills buy? (*J. R. McGuire*); (3) Pulpwood from improvement cuttings (*L. Holt*); (4) Pulpwood procurement combined with woodlot conservation (*M. R. Wilson*); (5) Harvesting pulpwood on small holdings (*F. C. Simmons*), and (6) Control of cutting practice (*R. G. Belcher*).

3558. PEEL, J. D. The prospects of the manufacture in Malaya of building boards and paper. *Malay. Forester* 18 (1), 1955 (5-20). 21 refs.

Discusses availability of raw materials, possible products, demand, economic considerations, and technical considerations. It is concluded that prospects are good for the manufacture of chipboard and fibreboard from wood waste, paper from rice

straw, and perhaps for cardboard. Work on pulping properties of Malayan materials is to begin at Keping.

3559. ISTAS, J. R., HEREMANS, R., and RAEKELBOOM, E. L. Caractères généraux des bois feuillus du Congo belge en relation avec leur utilisation dans l'industrie des pâtes à papier. [Suitability of Belgian Congo hardwoods for paper pulp.] *Publ. Inst. nat. Étude agron. Congo belge (Sér. tech.)* No. 43, 1954. pp. 121 + 5 plates. 118 refs. [F.] Price Fr. 80.

The study covers 6 exotic and 17 African species, some of which range from Sierra Leone to Angola and East Africa. A summary table analyses these under ash content (SiO_2 separately), extractives (with 4 solvents), cellulose (including % α -cellulose), lignin and pentosans. The significance of each of these fractions in paper-making is discussed with numerous examples. Similarly discussed, with examples and correlations, are the density and texture of the wood; the dimensions of the fibres (length, *L*; diam., *E*; width of lumen, *C*; and thickness of walls, *W*); and the coefficient of suppleness, *C/E*. A table gives the range, mean and standard deviation of *L*, *E*, *C* and *W* and the coefficients of suppleness and of felting *E/L* for the 23 species. A correlation table shows the relation between density, *C/E*, and the physical characters of the paper produced from each species and from two mixtures of 10 and 13 species respectively. A third section deals with pulping quality under storage (importance of insect and fungus damage), chemical and semi-chemical processes and bleaching. Because reliance will have to be placed in Africa, on a multiplicity of heterogeneous species, a process is required that will sufficiently delignify the harder while it does not over-cook the lighter woods. Only the kraft (sulphate) process appears to be sufficiently elastic. A table shows the effect of the Indian, Swedish, American, prehydrolysis and semi-chemical variants of this process on the yield of pulp and the characters of papers made by them from one species. Another table compares the yields and characters of papers derived from the two mixtures, with the mean results of each group when species are cooked separately. General and detailed information on each species is finally summarized separately with tables of % of distribution of *L*, *E*, *C* and *W* of fibres, which are illustrated in photomicrographs. Other general tables summarize the characters and chemical analyses of the pulps and the physical characters of the papers. Recommendations are: use of kraft process; rejection of species with density > 0.9 or with high SiO_2 content; for bleached pulp, rejection of species rich in extractives; mixtures of species, especially with Bamboo pulp; thorough enumeration of the forest; investigation of each species. Desiderata are: density 0.35-0.85, low SiO_2 , light colour, *L* > 1 mm., *C/E* > 35. With the last factor as criterion the order of excellence is: *Musanga cecropioides*, *Fillaeopsis discophora*, *Acacia decurrens* var. *mollissima*, *Acrocarpus fraxinifolius*, *Pinus sylvestris*, *Chlorophora excelsa*, *Grevillea robusta*, *Gilbertiodendron dewevrei*, *Blighia unijugata*, *Eucalyptus globulus*, *Newtonia*

leucocarpa, *Celtis zenkeri*, *C. mildbraedii*, *Deinbollia* sp., *Eucalyptus saligna*.

3560. CHIDESTER, G. H., and SCHAFER, E. R. **Pulping of Latin-American woods.** *Rep. U.S. For. Prod. Lab., Madison* No. 2012, 1954. pp. 13 + 5 tbs. 2 refs. P.R.

Describes briefly various pulping experiments on 39 individual species and 10 mixtures of species. The various mixtures were composed of these woods and 70 additional ones, making a total of 109 woods tested individually, or in mixtures, or both. The mixtures ranged in composition from 2 to 32 different woods. *From authors' summary.*

3561. CHIDESTER, G. H., and BROWN, K. J. **Use of bleached cold soda pulps from certain mixtures of Latin-American hardwoods in newsprint.** *Rep. U.S. For. Prod. Lab., Madison* No. 2013, 1954. pp. 8 + 7 tbs. 2 refs. P.R.

3562. Papier uit gemengd Surinaams loofhout. [Paper from mixed Surinam hardwoods.] *Meded. Inst. Trop. Amst.* No. 106 (*Afd. trop. Prod.* No. 40), 1954 (26-7, 66). [Due.]

Investigations at the Laboratorium voor technische Botanica van de technische Hogeschool, Delft, produced a satisfactory pulp by the sulphate process from a mixture of 45 species, corresponding to a Surinam forest type, in 3½ hours. The alkali consumption was 7.5% Na₂O, the total yield ca. 50%, and the permanganate number 34. An unbleached paper made on the small paper machine at the laboratory had satisfactory physical properties; the addition of 25% softwood pulp improved its resistance to tearing and folding. Preliminary tests showed that the pulp could easily be bleached to a high degree of brightness. Investigations on semichemical pulping are still in progress, but the neutral sulphite process has proved unsuitable for these mixtures.

3563. IJFF, J. W. **Onderzoek over de vcrwerking van gemengd Surinaams loofhout tot papiercelstof. [Research on the manufacture of paper pulp from mixed Surinam hardwoods.]** *Meded. Inst. Trop. Amst.* No. 110 (*Afd. trop. Prod.* No. 41), 1955. pp. 43. 41 refs. [Due.]

A detailed account of research already reported briefly. [See preceding abstract.]

3564. BHAT, R. V., and KAUSHIK, H. K. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XXV. Wrapping papers from *Acacia decurrens* Willd. (Wattle wood).** *Indian For.* 81 (2), 1955 (116-25 + 5 sample sheets). 1 ref.

Experiments in the production of sulphate and soda pulps are described. They showed that *A. decurrens* is a promising material for the production of wrapping papers in high yields and of satisfactory strength. The admixture of a long-fibred pulp (e.g. Bamboo) is desirable.

3565. TAYAMA, M., and ISHKAWA, S. ***Eucalyptus* pulp.** *Journal of the Japanese Technical Association of Pulp and Paper Industry, Tokyo* 8 (2), 1954 (2-7). [Jap. ?]. From *abstr. in Chem. Abstr.* 49 (2), 1955 (1326). P.R.

The chemical composition of Blue Gum (*Eucalyptus globulus*) is about the same as that of most hardwoods. When an unlined iron digester is to be used to cook it by the neutral sulphite semi-chemical process, the tannin (present in significant amounts) must be pre-extracted. The pulps are bleached easily by the 3-stage bleaching method, and the colour retention is slight. Except for sulphite pulp, both bleached and unbleached *Eucalyptus* pulps are superior in strength to unbleached Red Pine sulphite pulp. *Eucalyptus* kraft pulp and neutral semi-chemical sulphite pulps are suitable for paper, but these results are valid only for Blue Gum, and other species are not always suitable raw materials for paper.

3566. JENSEN, W., AARNIO, F., and LINDHOLM, B. Björk som råmaterial för massaframställning. VIII. Jämförelse av björk- och tallsulfatmassors blekbarhet. [Birch as raw material for pulp. VIII. Comparison of the bleaching properties of Birch and Pine sulphate pulps.] *Pap. ja Puu* 37 (1), 1955 (5-8). 7 refs. [Swe.] P.R.

Birch could be bleached to an equal degree of whiteness with a rather lower consumption of Cl and alkali than was needed for Pine. Both bleached and unbleached Birch pulps showed higher viscosity, and thus less reduction in strength, than Pine. Graphs and tables have English legends.

3567. KLAUDITZ, W., STOLLEY, I., and BERLING, K. Über die Eignung des Holzes von Weidenruten zur Herstellung von Zellstoff, Papier, Holzfaser- und Holzspanplatten. [The suitability of osier rods for manufacturing pulp, paper and wood-fibre and chip boards.] *Holzsucht, Lignikultur* 8 (6), 1954 (45-8). 14 refs. [G.]

Results of studies on the moisture content, density, wood anatomy, reaction-wood formation, bark content and chemical composition of 1-year-old rods of *Salix viminalis* and *S. dasyclados* are tabulated. Sulphate and sulphite pulping trials with barked rods gave pulp and paper with satisfactory strength properties but pulp yields rather lower than for mature wood. Unbarked rods gave paper with unsatisfactory strength properties and still lower pulp yields. Satisfactory fibre-boards were obtained from barked rods but they could not compete in price with boards from the normal Spruce assortments. Boards from unbarked rods were unsatisfactory. Chipboards with satisfactory strength properties were obtained from the unbarked material with resin binder; further examination of costs would be needed. Preliminary investigation showed that satisfactory insulation boards could be made from the bark.

3568. VILLIÈRE, A. Le procédé 'Isogrand' pour la fabrication de pâte cellulosique à partir des bois feuillus. [The 'Isogrand' process for making hardwood pulp.] *Bois For. Trop.* No. 39, 1955 (45-8). [F.f.e.span.]

Describes a process, developed by the Sté. Isorel of Casteljaloux (Lot-et-Garonne), for semi-chemical pulping of tropical hardwoods and vegetable residues. The finely comminuted wood is given a preliminary treatment with a weak alkaline solution

to remove resins, etc., and is then treated successively with chloride and alkaline solutions. The process is still in the experimental stage, but pilot-plant experiments show promising results. A daily paper has printed part of one of its editions with paper made from 13 Brazilian hardwoods.

3569. DENTREMONT, A. E. **Chem-groundwood hardwood pulping process.** *Paper Tr. J.* 139 (8), 1955 (32...42). P.R.

Describes the results of experiments since 1952 at the experimental pilot plant of the Great Northern Paper Co. with Poplar and dense hardwoods. White and Yellow Birch yielded good pulp, Hard Maple and Soft Maple gave acceptable pulp only when cooked together, while Beech pulp was below standard. It was found that wood with a moisture content (m.c.) above the fibre-saturation point was less penetrable by the chemicals than wood with a lower m.c. A 400-ton commercial-scale plant has now been put in operation. Four-ft. logs are conveyed into the vertical digester, subjected to a vacuum of 27-28 in. for 30 min., after which the cooking liquor is forced into the digester and a hydrostatic pressure of 150 lb./sq. in. (over atmospheric pressure) is maintained throughout the cooking cycle. The liquor is a Na_2CO_3 solution of suitable concentration, consistently sulphitized with gaseous SO_2 . After cooking, the liquor is blown to an accumulator, to be re-cycled in another digester, while the cooked logs are ground to pulp.

862. *Composite Materials made Wholly or Partly of Woody Matter*

See also Nos. 3424, 3430, 3435, 3443, 3459, 3519, 3558, 3613.

3570. SAWALL, H. *Die Holzspanplatte.* (Fertigung und Verwendung.) [Wood chipboards. (Manufacture and uses.)] Helmut Gros, Berlin. 1953. pp. 64 + 20 photos. [G.] P.R.

Describes the various uses of chipboard, different aspects of working with it, the question of cost and the part played by chipboard in industry; the following proprietary kinds are described: Behr, Homogenholz, Novopan, Okal, and Wepra.

3571. FEHN, H. *Tresponplater: en orientering og en oversikt over forskjellige europeiske fabriksjonsmetoder.* [Chipboards: a preliminary review and a survey of different European manufacturing methods.] *Utredn. Norsk tretekn. Inst.* No. 9, [1954]. pp. 29 + 1 tbl. + 15 photos and dgms. [Nor.] P.R.

Discusses general points in chipboard manufacture and describes in more detail the products and the processes used by: Ji-Te Fabrikker and Sveahus (Bremmer boards), Sweden; Fahrni Institute (Novopan), Interwood, and Fibrexa (Tavapan), Switzerland; P. Harder (Curvi-Board), Lichtenstein; Ferd. Schenk (Duroplan and Struktoplan), Rohenstroht (Wirus), O. Kreibbaum (Okal), Nord Deutsche Homogenholz, Rottmann (Rowi) and Fibroplast, Germany; Vere Engineering Co. (Bartrev), Aircrow Co. and Jicwood Ltd. (Weyroc) and British Plimber Ltd. (Plimberite), England; and Quenild (Novotex), Norway. There is a summary table showing the raw

material, capacity, capital investment, and weight and uses of the boards for each firm.

3572. KOLLMANN, F. *Die automatische Herstellung mehrschichtiger Spanplatten nach dem Novopanverfahren in den U.S.A.* [Automatic manufacture of multi-layer chipboards by the Novopan method in the U.S.A.] *Holz Roh- u. Werkstoff* 12 (10), 1954 (378-81). [G.g.] P.R.

Describes the different stages of production and the results obtained at the Shasta, Calif., plant of the U.S. Plywood Corporation.

3573. **New type chipboard.** *Timb. Tr. J.* 212 (4089), 1955 (95-6).

Departures from orthodox manufacture at the new 'Weyroc' factory of the Aircrow Company and Jicwood Ltd., at Annan in Scotland are (a) the use of specially prepared chips, the dimensions of which are carefully controlled, prepared from essentially one species of softwood, which gives unusual control over variability in material; (b) chip grading and sorting in manufacture to ensure that fine material remains at the surface of the board. The basic raw material will be forest thinnings and the project is considered important as a new outlet for these. [Cf. *Abstr.* 16 (p. 304).]

3574. COOKE, W. H. **Sheathing board from Ponderosa Pine mill residues.** *Rep. Ore. For. Prod. Lab. No. L-4*, 1954. pp. [1] + 26. P.R.

Phenolic-resin-bonded test panels of mill-residue sheathing board were prepared from green Ponderosa Pine slabs which were chipped and hammer-milled with and without bark. Overlays of kraft paper were applied, which markedly improved the strength values and physical properties. Bending strengths varied from ca. 1200 to 2000 lb./sq. in. with specific gravities from ca. 0.550 to 0.700. Resin and size content were both 4%. Erection and operation cost estimates for a plant to manufacture such board are presented. *From author's summary.*

3575. CHRISTENSEN, F. J., and ELLIS, M. L. **Sub-project U.15-3—Physical, mechanical and chemical properties of sawdust in combination with cement and/or binders.** Progress report No. 2. **Experiment U.15-3/2. The suitability of *Xanthorrhoea* resin as a binder for sawdust in the manufacture of hardboard by a dry process.** (First report.) Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 12. 2 refs. Limited distribution. P.R.

Results of tests show that, even with 20% of resin, the mechanical strength and water resistance are considerably less than those of synthetic-resin/sawdust boards produced under comparable conditions.

3576. **Fibreboard from secondary colonial timbers.** *Colon. Res., Lond.* 1953/1954, 1954 (31-2).

A short chemical treatment of chips of *Koompassia malaccensis*, followed by mechanical defibration, resulted in a high yield of pulp from which boards of more than adequate strength have been made. A similar process gave good results with *Shorea leprosula*. *Juniperus procera* chips from a large heartwood log, steamed under pressure without

chemicals and then mechanically defibrated, produced a board with excellent water-resisting properties and durability: boards from small, mainly sapwood, logs had neither of these qualities.

3577. BERGSTROM, H. O. V., HELMER, G. B., and TROBECK, K. G. Verfahren zur Herstellung ölgehärteter Faserplatten. [Method of manufacturing fibreboards hardened with oil.] *German Patent No. 882,306*, July 6, 1953. pp. 3. [G.] P.O.

3578. NOWAK, A. Die Veränderungen von Lignocellulose bei Wärmebehandlung unter pH-Kontrolle mit besonderer Berücksichtigung der Herstellung von Faserplatten. [Changes in lignocellulose during heat treatment, with controlled pH, with special reference to fibreboard manufacture.] *Holz Roh- u. Werkstoff* 12 (11), 1954 (427-34). 4 refs. [G.g.] P.R.

Presents in graphs and tables the results of a research on the technical effect of a weakly alkaline heat treatment of lignocellulosic material (Spruce and Beech wood). The graphs show the yield of fibreboards, their bending properties, water absorption, density, and swelling, as functions of the quantity of NaOH used, pressure, and time of reaction. Other graphs show the effect of comminution and subsequent hardening on water absorption and bending properties. Since the material obtained from wood by the above treatment at pH 6 (yield 80-87% according to species) is soft and plastic and has marked bending properties, it is concluded that the lignin must have undergone a modification. After another acidification (down to pH 4.5), the mass is moulded and compressed between hot plates. Lignin is said to undergo condensation, as phenols do, with acidic catalysts.

3579. HELGE, K., and KROGSTAD, K. Forskningsarbeider utført ved Papirindustriens Forskningsinstitutt over fremstilling og kvalitetsbedømmelse av hårde wallboardplater. [Research at the Paper Industry Research Institute on the manufacture of hard wallboard and the determination of its properties.] *Norsk Skogind.* 9 (1), 1955 (12-6). [Nor. nor.e.] P.R.

Deals mainly with the causes of variation in thickness of boards and its effect on their properties.

3580. PERKITNY, T., and KRYCZKO, M. Wpływ stosowania przerwy w prasowaniu na wytrzymałość płyt pilśniowych. [Effect of interruption in pressing on the strength of fibreboards.] *Sylvan* 98 (5), 1954 (437-40). [Pol.pol.]

Tests have confirmed the fact, known from practice, that temporary release of pressure to assist drying adversely affects the mechanical strength of the product.

863. Wood Hydrolysis. Saccharification

3581. WENZL, H. F. J. Chemie und Technik der Säurehydrolyse des Holzes. II. Die technischen Verfahren der Holzhydrolyse. [Chemistry and technology of the acid hydrolysis of wood. II. Industrial methods of wood hydrolysis.] *Holzforschung, Berlin* 8 (4), 1954 (103-16). 68 refs. [G.g.e.] P.R.

Illustrated descriptions of the following methods and processes used in the industrial-scale acid saccharification of wood: Rheinau, modified Rheinau, Scholler, Madison, and TVA. [Cf. *For. Abstr.* 16 (No. 1211).]

864. Utilization of Lignin

See also No. 3383.

3582. MARSHALL, H. B., and NEWCOMBE, A. G. The relationship between the phenolic content of lignin sulphonates and their tanning properties. *Pulp Paper Mag. Can.* 56 (1), 1955 (101-5). 11 refs.

That the low tanning power of lignin is due to low phenolic hydroxyl content is confirmed and a process is described whereby this content can be increased in the lignin sulphonates in waste sulphite liquors (w.s.l.) by the condensation of phenols with the latter in aqueous solution. The phenolic hydroxyl content and with it the tanning powers of the phenol-lignin sulphonate condensation product are increased in direct proportion to the amount of condensed phenol. This product could be blended up to 50% with quebracho without affecting leather quality. The process may be economic. Condensation products of di- and trihydric phenols with w.s.l. have properties comparable with vegetable tannins. These products are not at present competitive but a valuable strategic reserve source is indicated. Tanning agents prepared by condensing w.s.l. with cresols (discarded by petroleum refineries) have a limited commercial application.

865. Plastics

3583. WNUK, M., and SOBCZAK, J. Możliwości wykorzystania odpadów fornirowych do produkcji obryzy koł sterowych do ciągników. [Utilization of veneer waste for making the rims of tractor steering wheels.] *Prace Inst. Tech. Drewna* 1 (1), 1954 (58-69). 2 refs. [Pol.russ.e.] P.R.

According to Polish specialists, the proportion of dry veneer waste in plywood plants is ca. 2% of the total material, and of bakelite-glue-coated veneer waste in plants making water-resistant plywood, ca. 0.1%. The width of the waste strips ranges up to 19 cm., the modal value being ca. 7-8 cm. A method has been developed for utilizing this waste to manufacture the rims of tractor steering wheels. Waste strips (> 1.5 mm. thick) are first coated on either side with glue (hot-curing phenol-formaldehyde or similar type at 140 g./sq. m.), cured, and cut into strips up to 25 × 100 mm.; these strips plus 'sawdust' obtained during comminution are put into special moulds where they are compressed and heated. The rims so obtained did not show any trace of deterioration after one year's service, while the service life of solid-wood rims is ca. 6 months.

866. Utilization of Wood Extractives

See also Nos. 3582, 3609.

3584. PROSIŃSKI, S., KONTEK, W., and SIWEK, K. Z badań nad wpływem wilgotności karpiny na przebieg procesu jej ekstrakcji. [Effect of moisture content on resin extraction from stump wood.] *Prace Inst. Tech. Drewna* 1 (1), 1954 (23-37). 11 refs. [Pol.pol.russ.e.] P.R.

Stump-wood chips ($10 \times 2 \times 1$ and $20 \times 5 \times 2$ mm.) (*Pinus sylvestris*?), with a moisture content (m.c.) between 0 and 50%, were extracted with benzine in a Soxhlet apparatus for 1-15 hours. Benzine and turpentine were removed from the extract by steam distillation, and the rosin-residue was dried at 105°C . It was found that, for a given time of extraction, the 20-mm. chips yielded more extract than the 10-mm. A high rosin yield can only be obtained when the m.c. of the chips does not exceed 18%; this limit should be lowered in practice to 15%. Both excessive m.c. and bringing to oven-dry condition, unfavourably affect the rosin yield and the duration of the process.

867. Destructive Distillation

3585. CARRAPIETT, J. B. Charcoal burning in the Delta Forest Division [, Burma]. *Burmese For.* 4 (2), 1954 (113-7). [E.]

Describes the brick kilns used, their lay-out and operation.

3586. Charcoal production and uses. *Bull. Ntheast. Wood Utiliz. Coun.* No. 37, 1952. pp. 101. 18 refs. Price \$2.

Contains the following articles: The physical and chemical properties of commercial charcoals in relation to industrial use (C. A. Stokes and H. Friedenstein); Small rectangular charcoal kilns (H. W. Hiscock); Charcoal production in steel drums (H. I. Baldwin); The continuous carbonization of wood: Sific process (A. Lambiotte); History and present status of the industry; continuous carbonization, the Mellman retort (D. F. Othmer); Beehive kiln operation (D. F. Othmer); Domestic uses and distribution (C. K. Richardson); Industrial uses (S. P. Kelly); Briquetting of charcoal (R. S. Aries); and Active carbon (J. W. Hassler).

3587. LIU, W.-H. [Experiments on the dry distillation of Bamboo in Taiwan.] *Bull. Taiwan For. Res. Inst.* No. 38, 1952. pp. 61 + 1 tbl. 24 refs. [Chin.e.]

Eleven species of Bamboo were used in experiments on dry distillation. Results [given in tables and summarized in a table with English legends] show that although yields of charcoal are highest from *Leleba oldhami*, *L. multiplex* and *Bambusa stenostachya*, the charcoal obtained has a lower C content and therefore a lower calorific value than that from *Phyllostachys makinoi*, *P. edulis* and *Dendrocalamus latiflorus*; the yields of methanol and of acetic acid recovered are higher for the last 3 species. The Bamboo charcoal was of satisfactory quality. Ash from the charcoal differed in colour with the different species. Dry distillation of Bamboo gave larger yields of gas, tar and methanol but smaller yields of pyrolygneous acid than hardwoods or softwoods. *From author's summary.*

3588. BALE, A. P. Charcoal from wood waste. *Wood* 20 (1), 1955 (26-7).

Details of the operations at Wundowie, Western Australia, where 60,000 tons/year are drawn from Jarrah/Wandoo forest (50 years' supply) to produce lumber, firewood, charcoal and distillation products. The charcoal is used to smelt 25,000 tons of iron ore annually.

3589. BRYKOV, S. Arrangement and test figures for gas power plant for small rivers. *Morskoi i Rečnoj Flot, Moskva* Sept., 1954 (18, 19). [Russ.] From *abstr. in Fuel Abstr.* 17 (1), 1955 (No. 576). P.R.

A standard Soviet gas producer, using wood, with scrubber and filter, was successfully installed on a river vessel in conjunction with a KDM-46 diesel engine converted to dual fuel.

3590. ČALOV, N. V. Vlijanje vlažnosti i visoty sloja ščepý v gazogeneratore na vyhod smoly i uksusnoj kisloty. [Effect of the moisture content and bed thickness of wood blocks in a gas-producer on the yield of tar and acetic acid.] *Derev. lesohim. Prom.* 2 (12), 1953 [16-9]. 14 refs. [Russ.] From *abstr. in Prace Inst. Tech. Dřevna* 1 (1), 1954 (72). [Pol.] P.R.

Results of trials show that, to ensure a high yield of the liquid products of destructive distillation, it is necessary to use dry wood, in particular forest waste, and to reduce the height of the bed to a minimum (50 cm.).

3591. EJDUS, B. R. O tehnologiji pererabotki drevesnoj smoly. [The technology of wood-tar processing.] *Derev. lesohim. Prom.* 2 (11), 1953 [15-6]. [Russ.] From *abstr. in Prace Inst. Tech. Dřevna* 1 (1), 1954 (72-3). [Pol.] P.R.

Tables show that, when wood-tar is distilled over charcoal, the total yield of products attains 80% of the initial tar weight. Simultaneous heat-treatment of tar and wood and, in particular, distillation over charcoal, reduce the amount of O compounds in the tar; at the same time the tar coke condenses on charcoal, thus increasing its density.

89. OTHER ('MINOR') FOREST PRODUCTS

See also section 28.

892. Vegetable Products

892.1. Grass. Litter. Leaf Fodder

See No. 3040.

892.4. Bark Products. Tanstuffs. Cork

See also No. 3388.

3592. SAVARD, J., and GUNET, P. Les tanins végétaux d'Afrique. [The vegetable tanstuffs of Africa.] *Bois For. Trop.* No. 38, 1954 (43-53). 13 refs. [F.]

Reviews and summarizes existing data on the main forest species of tropical Africa that provide tanbark: *Acacia* spp. (particularly *A. scorpioides*), *Bauhinia* spp., Mangroves, Eucalypts and miscellaneous species.

3593. PUSTELNIK, W. Análisis de la corteza de mangle colorado (*Rhizophora mangle* L.) del oriente de Venezuela y su importancia en la elaboración de extractos curtientes sólidos. [Analysis of the bark of *R. mangle* from eastern Venezuela, and its importance in the manufacture of solid tanning materials.] *Agronomía tropical, Maracay* 3 (2), 1953 (107-16). 9 refs. [Span.span.e.] H.S.B.

3594. **Bark analysis.** *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (21-3). 3 refs.

[Cf. *For. Abstr.* 15 (No. 2089).] The possible causes of differences in the estimation of tannin content on the part of two independent analysts, both using the Roux spectrophotometric and hide-powder methods, are discussed. The necessary conditions for the former method to give results reproducible within 1% when made on different days and normally varying within $\pm 3\%$ of those found by the hide-powder method, are given. No material change was revealed in tannin content of air-dried ground bark analysed in August-November 1952 and re-analysed in July-August 1954. Preliminary experiments are reported with a modified Proctor extraction process, and on the effect of season on bark extractives; while the tannin content remains fairly constant during the Oct.-Feb. stripping period, the non-tan content drops markedly about midsummer (Jan.-Feb.).

3595. **GORDON-GRAY, C. G. Black Wattle tannin—analytical problems and difficulties.** *Rep. Wattle Res. Inst. S. Afr.* 1953/54, 1954 (37-43). 3 refs. [*Repr. from South African Industrial Chemist, [Johannesburg]* 8 (8), 1954.)

The official international method requires analysis in duplicate giving agreement on tannin content within 0.6%; two laboratories should agree within 3.0% on the same sample. Extraordinary variations are found by the same laboratory if analysis is repeated on different days. From a collaborative investigation into the causes of discrepancies it is concluded that the variation found at different laboratories might be greatly reduced by adopting the following precautions: standardizing equipment (oven-shelf temperatures, desiccators, desiccants, and balance weights); complete pulverizing of the bark; determining its absolute moisture content; handling residues in a definite order during heating and weighing (for evening out moisture absorption). More work is required to establish this conclusion.

3596. **FCCG, H. G. W. Bark fibre as a soi improver.** *Grower, London* 42 (15), 1954 (675). H.S.B.

Bark from Poplars pulverized to a mixture of fibres and fine particles has been used successfully as a mulch or for lightening heavy soils. For digging in along with manure, a layer 3-4 in. deep is recommended; otherwise a dressing of 6 lb. $(\text{NH}_4)_2\text{SO}_4$ to each cwt. of fibre is necessary to forestall any possibility of denitrification. If the fibre has been stacked in the open for about 10 months, it will have thoroughly decomposed and the addition of $(\text{NH}_4)_2\text{SO}_4$ is unnecessary. For mulching, the fibre can be used fresh or partially decomposed.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants etc.

3597. **KEPHART, J. C. Chlorophyll derivatives—their chemistry, commercial preparation and uses.** *Econ. Bot.* 9 (1), 1955 (3-38). 93 refs.

Detailed information under the above heads, with 93 references.

3598. **PRISTA, L. V. NOGUEIRA.** Estudo químico-farmacognóstico do *Ptaeroxylon obliquum*, (Tumb.) Radlk. [Chemical and pharmacognostic study of *P. obliquum*.] *Anais da Faculdade de Farmácia do Porto, Porto* 11, 1951 (81-141 + 5 plates). [Port.] L.S.

Geographical distribution, systematics, morphology and histology with a detailed study of the chemical constituents.

3599. **BROWN, F. C., HOBBS, J. J., HUGHES, G. K., and RITCHIE, E.** The chemical constituents of Australian *Flindersia* species. VI. The structure and chemistry of flindersine. *Aust. J. Chem.* 7 (4), 1954 (348-77). 19 refs. O.R.S.

3600. **HAM, E. A., SCHAFER, H. M., DENKWALTER, R. G., and BRINK, N. G.** Structural studies on glaucarubin from *Simarouba glauca*. *J. Amer. chem. Soc.* 76 (23), 1954 (6066-8). 3 refs. O.R.S.

3601. **LOHWAG, K.** *Cortinellus berkeleyanus* Ito et Imai Syn. C. *shiitake* P. Henn. Der Shiitakepilz. [*C. berkeleyanus* (*C. shiitake*).] *Zeitschrift für Pilzkunde, Karlsruhe* No. 17, 1954 (1-7). 13 refs [G.] X.

Japan produces yearly ca. 1000 tons of this edible fungus which can grow on dead wood not only of *Pasania cuspidata*, but also *Quercus* spp., *Castanea* spp. *Alnus* spp., and other broadleaved species (Fagaceae with thin bark). Its cultivation is described in detail. [Cf. *For. Abstr.* 15 (No. 4379).]

892.6. Resin and Turpentine. Essential Oils.

Fixed Oils and Fats. Gums. Latex

Dyestuffs. Sap Sugar

See also Nos. 2648-50, 2728, 3031-9, 3575.

3602. **DATTILO, M.** Le resine naturali ed in particolare quelle del pino. [The natural resins, particularly those from Pine.] *Ital. agric.* 92 (1), 1955 (44-52). [It.] E.M.B.

A general account of the physiology of resin secretion and chemistry of resins, with some notes on resin tapping, illustrated by photomicrographs of resin canals in needles, wood etc.

3603. **PEJOSKI, B.** Viscosimetric measurements of Pine filtered oleoresins. *Naval Stores Rev.* 64 (10), 1955 (8-9, 20). 8 refs. [University of Macedonia, Skopje.]

An account of experiments already described [see *For. Abstr.* 16 (No. 2508)].

3604. **KALINIČUK, J. M., and PAŠKEVIČ, A. J.** Refraktometričeskii metod opredelenija kanifoli i skipidara v živice. [The refractometric method of determining the content of rosin and turpentine oil in crude resin.] *Derev. lesohim. Prom.* 2 (11), 1953 [11-15]. 6 refs. [Russ.] From *abstr. in Prace Inst. Tech. Dřevna* 1 (1), 1954 (71). [Pol.] P.R.

The method described gives reliable results and requires only 20-30 min., which is a fraction of the time used for the conventional analysis.

3605. **BARDYŠEV, I. I., and GUSAKOVA, M. V.** Sostav skipidara iz živicy pihty Sahalinskoi (*Abies sachalinensis* Fr. Schem.). [Composition of turpentine from the resin of *A. sachalinensis*.] *Z. prikl.*

Him. 27 (10), 1954 (1106-9). 4 refs. [Russ.russ.] P.O.

The turpentine contains *l* + *dl*- α -pinene, *l* + *dl*-camphene, *l*- β -pinene, *l*- β -phellandrene, *l* + *dl*-bornyl acetate, sesquiterpenes and high-boiling constituents, and 2 unidentified constituents.

3606. MIROV, N. T. Composition of turpentines of Mexican Pines. *Unasylya* 8 (4), 1954 (167-73). 21 refs.

Tabulates data on the turpentines of 44 species (literature references, location, physical characteristics and chemical composition of turpentines, and general remarks).

3607. PALAZZO, F. C. L'industria resiniera nell'area della Sila. [The resin-tapping industry in the Sila region of Calabria.] *Ital. for. mont.* 9 (6), 1954 (284-8). [It.it.f.]

Discusses the resin-tapping industry based on the Corsican Pine stands of the Sila, analyses the output for 3 years, and concludes that the industry is very profitable and could support a much larger distillery than the existing one.

3608. DUPONT, G., DULOU, R., CLÉMENT, G., and MARTINEZ, N. G. Étude de l'huile essentielle de bay de Porto Rico. [The essential oil of *Pimenta racemosa* from Porto Rico.] *Bull. Soc. chim. France* 21 (9), 1954 (1082-4). 19 refs. [F.] O.R.S.

3609. ECKEY, E. W.; MILLER, L. P. Vegetable fats and oils. Reinhold Publishing Corporation, New York. 1954. pp. ix + 836. Price \$16.50. P.R.

3610. CASTRO, N. F. DE. Analysis of acorn oil. *Abstr. of thesis, in Dissert. Abstr.* 15 (1), 1955 (44-5). [University of Connecticut.] O.R.S.

The fixed oil obtained from acorns of *Quercus rubra* was examined and its physical and chemical properties are recorded. Hydrocarbons, wax, pigments and β -sitosterol were identified in the unsaponifiable portion and oleic, linoleic, stearic and palmitic acids in the fatty acids.

3611. MARKLEY, K. S. Caranday—a source of palm wax. *Econ. Bot.* 9 (1), 1955 (39-52). 10 refs. Repr. from *Journal of the American Oil Chemists Society* 30, 1953 (309-13).

Describes the very extensive, sometimes pure, stands of *Copernicia australis* in the Paraguayan Chaco with notes and illustrations of morphology and ecology. The yield of wax, equal in quality for many uses to Carnauba wax, is given. A table compares the characteristics of this with 3 other hard vegetable waxes.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

See also Nos. 3031, 3609-10.

3612. NARAYANAMURTI, D., and JETLEY, R. K. Studies on adhesives. Part XVII. Adhesives from the proteins of the seeds of *Albizia lucida*. *Indian For. Leaflet* No. 137, [n.d.]. pp. 5. Price 4as. or 5d.

The results indicate that these proteins may be suitable for the preparation of adhesives for commercial plywood, provided that sufficient quantities are available at a reasonable price.

3613. COWLING, R. L. Project U.3: Manufacture of fibre boards. Sub-project U.3-7: Fibre boards from vegetable material other than wood fibre. Progress report No. 1. Experimental boards from coconut fibre. Division of Forest Products, C.S.I.R.O., Melbourne. 1955. pp. 15. 3 refs.

Results of test suggest the possibility of developing a satisfactory hardboard without chemical additives.

892.8. Heather. Broom etc. Osiers. Canes and Bamboos. Reeds and Rushes.

Thatching Materials

See also Nos. 3567, 3587.

3614. REE, W. VAN. Tikars (matten) gedrenkt in 3% Superwolmanzout. [Mats soaked in 3% super Wolman salt.] *Rapp. Bosbouwproefsta., Bogor* No. 68, 1954. pp. 6. [Du.]

Unravelled material of mats from *Pandanus* sp. soaked for 2-24 hours in Wolman solution showed no appreciable decay after 1 month's exposure to *Trametes persoonii* or *Polystictus sanguineus*, while untreated material was badly decayed. No leaching tests were made.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90 GENERAL

3615. La productivité dans les industries de la forêt et du bois: rapport du Congrès de Stuttgart. [Productivity in the forest and the timber industry.] Organisation for European Economic Co-operation, Paris. 1954. pp. 263. [F.] Price 14s. (Fr.700: \$2.00.)

The conference, held in Sept. 1953 as a result of the work of Technical Assistance Mission No. 132, was concerned with methods of increasing productivity: (1) in the forest, by breeding, introduction of new species, fertilizing, improved silvicultural practices etc.; (2) in exploitation, by new techniques and improved training of workers; (3) in sawmills;

(4) in plywood factories; and (5) by increased use of woodwaste. The report reprints 36 papers on these subjects and on study of productivity in general.

3616. Progress reports on forest policy: United Kingdom. III. Northern Ireland. [Docum.] *European Forestry Commission, 7th Session, 1954*, No. FAO/

EFC/69-M Add. 1, 1954. pp. 3. Limited distribution.

3617. Progress reports on forest policy: Ireland. [Docum.] *European Forestry Commission, 7th Session, 1954*, No. FAO/EFC/69-F, 1954. pp. 3. Limited distribution.

3618. Rapports annuels de politique forestière: Espagne. [Progress reports on forest policy: Spain.]

FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW

[Docum.] *European Forestry Commission, 7th Session, 1954, No. FAO/EFC/69-Q, 1954. pp. 3. [F.] Limited distribution.*

3619. **Progress report on forest policy: Netherlands.** [Docum.] *European Forestry Commission, 7th Session, 1954, No. FAO/EFC/69-G, 1954. pp. 6. Limited distribution.*

3620. **Rapports annuels de politique forestière: Grèce. [Progress reports on forest policy: Greece.]** [Docum.] *European Forestry Commission, 7th Session, 1954, No. FAO/EFC/69-R, 1954. pp. 4. [F.] Limited distribution.*

3621. **Progress reports on forest policy: Turkey.** [Docum.] *European Forestry Commission 7th Session, 1954, No. FAO/EFC/69-T, 1954. pp. 10.*

3622. BELLOUARD, P. **La situation forestière de l'Afrique occidentale française. [Forest conditions in French West Africa.]** *Bois For. Trop.* No. 39 1955 (9-23). [F.f.e.span.]

A review of conditions in 1953, including forests, forest policy, silvicultural systems, organization, research, exploitation and utilization.

3623. HUGUET, L. **Algunas sugerencias sobre el problema forestal de México. [Some suggestions concerning Mexico's forest problems.]** *Mensajero for., Durango* No. 123, 1954 (10-5, 18... 21, 24-6). [Span.]

Reviews briefly the types of forest in Mexico, their extent, economic importance, and productive capacity; discusses the present forest law; and makes suggestions for a forest policy and ways of ensuring its implementation.

902. History of Forests and Forestry

See also Nos. 2796, 2798-9, 2822, 3299, 3684.

3624. MINCKWITZ, H. VON. **Waldgeschichtliches aus dem Schwarzerde-Eichengebiet zwischen Elbe und Harz. [Items of forest history of the black-soil Oak region between the Elbe and the Harz.]** *Arch. Forstw.* 3 (1/2), 1954 (105-21). 28 refs. [G.]

Outlines the forest history of 16 localities in the Saale-Bode drainage, tributary to the Elbe between the latitudes of Magdeburg and Halle. Covers the condition of the forests, malpractices and administrative obstruction, measures for conservation and improvements; provenance of seed (including an item of Spruce seed export from the Harz to England in 1778), free grants and details of stocking in the 16 localities.

3625. SCHMELZ, W. **Nutzungsgeschichtliche Erinnerungen aus dem Zerbster Land. [Notes on past utilization in the Zerbst area.]** *Arch. Forstw.* 3 (3/4), 1954 (226-9). 10 refs. [G.]

Covers composition by species, system of utilization, silviculture, stocking etc. in Zerbst in the 18th century. Once an independent principality with its own archives, this contains the original example of quasi-natural silvicultural management (*Dauerwald*) at Bärenthoren.

3626. ŻABKO-POTOPOWICZ, A. **Zagadnienie lasów w Polsce przed rozbiorami od schyłku XV do połowy XVIII wieku. [Forests in pre-partition Poland from the end of the 15th up to the mid-18th**

century.] *Sylvan* 98 (5), 1954 (364-88). 205 refs. [Pol.]

Describes the gradual establishment of forest ownership title by the Polish gentry, the ruthless forest exploitation, and the main export items of forest products. The references are mostly Polish, with a few German.

3627. DUVAL, M. **Recherches sur les origines des institutions forestières en Bretagne. [The origins of forest institutions in Brittany.]** *Rev. for. franç.* 7 (3), 1955 (211-6). [F.]

3628. SIMEUNOVIĆ, D. S. **Prilog u poznavanju šumsko-privrednih prilika u srednjovekovnoj srpskoj državi. [Forests in medieval Serbia.]** *Šumarstvo* 7 (9/10), 1954 (545-59). 48 refs. [Serb.e.f.]

An article based on relevant paragraphs in King Stefan Dušan's (1349-54) Codex.

3629. FUNAKOSHI, S. **[Types of utilization of forest and grassland by farmers.]** *For. [industr.] Econ., Tokyo* 7 (10), 1954 (1-9). 11 refs. [Jap.jap.]

A general account of conditions in 'feudal' (pre-1868) times and subsequent changes. Tables include one showing the area afforested by the state and by local authorities from 1897 to 1926; and another giving data of grass cut from the forest in typical farm holdings.

3630. FUNAKOSHI, S. **[Significance of Japanese land tax reform in forest history.]** *For. [industr.] Econ., Tokyo* 7 (11), 1954 (1-6). 26 refs. [Jap.jap.]

903. Forest Policy, General

See also No. 3299.

3631. HILEY, W. E. **The influence of forest economics on forest policy.** *Quart. J. For.* 49 (1), 1955 (5-16). 6 refs.

Chairman's address to Section K of the British Association, 1954.

904. General Regional Accounts of Forests and Forestry

3632. Skovbruget og dens organisationer i Danmark, Finland, Norge og Sverige. **[Forestry and forestry organizations in Denmark, Finland, Norway and Sweden.]** *Nordisk Skov-Union, Copenhagen.* 1950. pp. 99. [Dan., Sw., or Nor.]

Condensed accounts for each country, including summarized statistics, the administrative organization etc. of state, communal and private forestry, education and research, and associations and institutions concerned with forestry. Each account also contains an explanatory list of ranks and titles used in forestry in the country concerned.

3633. WIĘCKO, E. **Lasy w gospodarce ZSRR. [Forests in the national economy of the U.S.S.R.]** *Sylvan* 98 (5), 1954 (345-63). 35 refs. [Pol.]

A general survey based on Soviet literature, dealing with: forests of the U.S.S.R., their main species, composition, increment, distribution; forest policy since 1931; afforestation and reforestation work; wood consumption in the U.S.S.R.; mechanization of timber extraction; contribution of different regions to forest output; major categories of consumption in 1910-13 and 1952; and trends in the utilization of forest products.

3634. GAMCEMLIDZE, P. K. Lesnoe hozjaistvo Adžarskoj ASSR. [Forestry in the Adžhar A.S.S.R.] *Lesn. Hoz.* 5 (6), 1952 (60-2). [Russ.]

The forests of Adžhar (S.W. Transcaucasia) cover 169,000 ha. (92,000 ha. under state management) and contain a wide range of species pure or in mixture (*Alnus glutinosa*, *Fraxinus excelsior*, *Castanea sativa*, *Pterocarya caucasica*, *Ulmus campestris*, *Tilia cordata*, *Quercus* spp., *Carpinus* sp., *Buxus sempervirens*, *Taxus baccata* (single trees), *Diospyros lotus*, *Picea [orientalis?]*, *Pinus sylvestris*, *Betula verrucosa*, *Abies [nordmanniana?]* etc.) with underwood including *Prunus laurocerasus*, *Rhododendron* sp. etc. The policy is to preserve existing forests and to extend them by planting. Up to 1948, 471 ha. had been planted in the plains portion with Eucalypts, *Cryptomeria japonica*, Bamboos, *Pinus pinaster*, *P. taeda*, *Phellodendron amurense* etc. More recently afforestation has extended to the 200-600 m. level, on 20-30° slopes, using *Juglans regia*, *Diospyros lotus* and *Robinia pseudoacacia*, and to 800-2000 m. with sowings of *P. sylvestris* on 225 ha.

3635. POZDNIJAKOV, L. K. Lesa bassejna reki Olėkmy. [Forests of the basin of the R. Olekma [S.W. of Yakutsk.]] *Priroda, Moskva* 44 (1), 1955 (101-5). [Russ.] A.P.B.

A very general description, with brief notes on the chief tree species. *Larix dahurica* occupies ca. 90% of the forest area. *Pinus sylvestris*, *P. sibirica*, *Picea obovata*, *Betula* spp., *Populus tremula* and *P. suaveolens* are among other species noted.

3636. ERAŞAN, İ. Trakya ve bilhassa Demirköy muntakası meşer ormanlarının amenajman esasları hakkında araştırmalar. [Research on the bases of yield and forest management in the Oak forests of Turkey-in-Europe, with particular reference to those of Demirköy.] *Tar. Bak. (Vek.) Örm. gen. (umum)* *Müd. Yav. No.* 132, 1954, pp. 250 + 6 maps. 327 refs. [Turk.]

The section on Turkey-in-Europe deals with geography, geology and climate, flora (distribution of trees and shrubs; associated flora), forests and the history of forest management; and those on Demirköy with the district, its forests, silvicultural systems, output by assortments, damage, research on increment and stand structure, and management for different purposes.

3637. STRACEY, P. D. Forestry in Assam. *Indian For.* 80 (12), 1954 (759-67 + 7 photos). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the history, growth and current activities of the Forest Department.

3638. PAL, N. Forestry in W. Bengal. *Indian For.* 80 (12), 1954 (768-73 + 1 plate). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the history, growth and current activities of the Forest Department, reorganized after the 1947 partition of Bengal province.

3639. PRASAD, S. S. Bihar's forest development. *Indian For.* 80 (12), 1954 (779-82). (4th World Forestry Congress, 1954.)

Describes the problems created by the accession

of ca. 9500 sq. miles of zamindari forest in Chatanagpur to the Forest Department (Bihar Private Forests Act, 1947) and how they have been tackled.

3640. DATTA, R. N. Forestry in Madhya Pradesh. *Indian For.* 80 (12), 1954 (816-22). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the history, growth and current activities of the Forest Department, whose former forest estate in the Central Provinces and Berar was enlarged in 1951 following the accession of 15 former princely states.

3641. SETH, S. K. Forests and forestry in Uttar Pradesh. *Indian For.* 80 (12), 1954 (851-60 + map). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the organization and current activities of the Forest Department. Its estate has grown from 6207 to 13,375 sq. miles since 1947, owing to State and zamindari mergers, with consequent expansion of working plan and afforestation work. The Rajasthan border afforestation scheme (1953) is outlined.

3642. SHARMA, R. P. Forestry in Rajasthan. *Indian For.* 81 (1), 1955 (14-8).

A summary account for this new state of the Indian Union (formed from the merger of 22 princely states; ca. 130,000 sq. miles with 10% under forest) with special reference to the organization, activities and problems of its Forest Department.

3643. NAGDEV, D. P. The forests of Ajmer state. *Indian For.* 80 (12), 1954 (742-5 + 3 photos). (4th World Forestry Congress, 1954.)

A summary account, with particular reference to artificial regeneration in the new reserves under the Five-Year Plan (1948). Includes a note, with photograph, on the use of planting bricks [cf. *For. Abstr.* 13 (No. 2109)].

3644. PILLAI, K. R. N. The forests of Bhopal state. *Indian For.* 80 (12), 1954 (774-8). (4th World Forestry Congress, 1954.)

A summary account, including history of their management, and the current activities and problems of the Forest Department; not the least of these is lack of trained staff and the resumption of > 700 sq. miles of private (*jagir*) forest urgently needing rehabilitation.

3645. SONDHİ, G. S. Forests of Madhya Bharat. *Indian For.* 80 (12), 1954 (810-5). (4th World Forestry Congress, 1954.)

A summary account for this new State of the Indian Union (ca. 46,500 sq. miles and 8 million people, forests 34%) with special reference to the organization, activities and problems of its Forest Department, created in 1948 and now busy with the First Five-Year Plan of 1951.

3646. SAIGAL, D. D. Forests of Vindhya Pradesh. *Indian For.* 80 (12), 1954 (861-5). (4th World Forestry Congress, 1954.)

A summary account for this new State of the Indian Union (ca. 23,200 sq. miles, of which 33% are forested) with special reference to the organization, activities and problems of its young Forest Department, busy with Working Plans for rehabilitating the over-exploited forests of the former princely states.

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3647. CHANDRA, R. **Forestry in the Punjab (1).** *Indian For.* 80 (12), 1954 (840-5 + 2 photos). (4th World Forestry Congress, 1954.)

A summary account of the present organization and activities of the Forest Department, reorganized after the 1947 partition of the Punjab province.

3648. SINGH, B. **Forests of the Patiala and East Punjab States Union.** *Indian For.* 80 (12), 1954 (834-9). (4th World Forestry Congress, 1954.)

A summary account for this new State [PEPSU] of the Indian Union (ca. 10,000 sq. miles and $3\frac{1}{2}$ million people, forests 2-9%) with special reference to the organization, activities and problems of its small Forest Department, created in 1949.

3649. RAM, B. S. **Forests and forestry in Himachal Pradesh.** *Indian For.* 81 (1), 1955 (7-13).

A summary account for this new State of the Indian Union (21 former Punjab Hill States and their 9 tributaries; with ca. 3300 sq. miles or 32% of the total area, under forest) with special reference to the organization, activities and problems of its Forest Department (1948).

3650. PATHANIA, H. S. **Forests of Jammu and Kashmir.** *Indian For.* 80 (12), 1954 (804-9 + 4 photos). (4th World Forestry Congress, 1954.)

A summary account; with special reference to the history, growth and current activities of the Forest Department.

3651. KAIKINI, N. S. **The forests of Bombay State.** *Indian For.* 80 (12), 1954 (783-6 + 1 plate). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the history, growth and current activities of the Forest Department, whose former forest estate was greatly enlarged after independence by the accession of the former princely states of the Presidency.

3652. RAI, D. **Forests of Hyderabad State.** *Indian For.* 80 (12), 1954 (792-7 + 2 photos). (4th World Forestry Congress, 1954.)

A summary account, with particular reference to the history of reservation and developments since the State's merger with the Indian Union (1948).

3653. DESAI, H. R. **The forests of Saurashtra.** *Indian For.* 80 (12), 1954 (846-50 + 6 photos). (4th World Forestry Congress, 1954.)

A summary account of this new State of the Indian Union (formed from mergers of the princely States of Kathiawar), with special reference to the organization and activities of its new Forest Department. Only ca. 4-3% of the State is forested, about 60% being reserves.

3654. IYPPU, A. I. **Forestry in Travancore-Cochin State.** *Indian For.* 81 (1), 1955 (19-25). (4th World Forestry Congress, 1954.)

A summary account, for this new State of the Indian Union (ca. 9100 sq. miles, forest reserves nearly 3000 sq. miles) with special reference to former history and the organization, activities and problems of the new Forest Department.

3655. TRIMURTI, N. **The forests of Coorg State.** *Indian For.* 81 (1), 1955 (3-6 + 2 plates). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the history, growth and current activities of the Forest Department.

3656. KHAN, A. A. **The Andhra forests.** *Indian For.* 80 (12), 1954 (753-8). (4th World Forestry Congress, 1954.)

A summary account of the forests and forestry, past and present, of this newest State of the Indian Union (1953), previously part of Madras Presidency. The Forest Department controls 24% of the total land area of 64,543 sq. miles.

3657. RAMASWAMY, M. N. **Forestry in Mysore.** *Indian For.* 80 (12), 1954 (830-3 + 2 photos). (4th World Forestry Congress, 1954.)

A summary account, with particular reference to current organization and activities of the Forest Department and a note on the Forest Research Laboratory at Bangalore.

3658. BHADRAN, C. A. R. **Forests and forestry in the Madras State.** *Indian For.* 80 (12), 1954 (823-9). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the organization and current activities of the Forest Department.

3659. BANERJI, J. **Forestry in the Andaman and Nicobar Islands.** *Indian For.* 80 (12), 1954 (746-52). (4th World Forestry Congress, 1954.)

A summary account, with special reference to the history, growth and current activities of the Forestry Department, including progress of the Colonization Scheme. The N. Andamans forests were leased for 25 years from 1951, on a royalty basis.

3660. CHEIN HOE, T. **Forestry in independent Burma.** *Indian For.* 80 (12), 1954 (787-91). (4th World Forestry Congress, 1954.)

Summarizes the activities of the Burma Forest Department since 1948, with data on forest areas and cadres.

3661. ORTIZ R., G. **Visión agrícola y económica del territorio Vasquez (Boyaca).** [Agricultural and economic survey of the Vasquez region (Boyaca).] *Agric. trop., Bogotá* 10 (9), 1954 (35-45). [Span.] A.P.B.

Includes brief notes on the timber industry and exploitable species, with particular reference to the Toncana palm, *Socrates* sp.

3662. GUERRERO P., T. A. **Forests of Ecuador** *J. Oxf. Univ. For. Soc. (Ser. 4)* No. 3, 1954 (31-9). 2 refs.

Natural regions, climate and main forest types. The author estimates that ca. 40% of the land area is forest.

3663. WALTON, A. B. **Forests and forestry in North Borneo.** *Malay. Forester* 18 (1), 1955 (20-3 + 3 photos). 2 refs.

3664. MUIR, W. D. **Some impressions of forestry in New Zealand.** *Aust. Timb. J.* 20 (9), 1954 (707 . . . 726).

A comprehensive account (with some detailed statistics) covering topography, climate, agriculture, native forests, government and private exotic plantations, mills, plantation management and notes

on plantations visited. Serious mistakes are indicated in seed selection (poor forms of *Pinus radiata*, *P. ponderosa*, *P. nigra*, *P. contorta* and *P. caribaea*); in lack of thinning; choice of species (more Douglas Fir should have been planted); and siting of plantations. The Pines are subject to Sirex damage; the Douglas, not. Notes are included on the silviculture of Kauri and *Podocarpus*.

905. Forest Statistics and Resources

3665. KALLIO, K. Asutustoiminnassa muodostettujen viljelystilojen metsämaa-alojen suuruussuhteista. [The proportion of woodland in small holdings under land settlement schemes in Finland.] *Acta for. fenn.* 61 (25), 1954. pp. 19. [Fig.]

3666. Domänverket 1953: Kungl. Domänstyrelsen. [Work in the State Forests, 1953, by the Royal State Forestry Board.] *Sveriges Officiella Statistik: Skogshushållning*. Kungl. Boktryckeriet P. A. Norstedt & Söner, Stockholm. 1955. pp. viii + 132. [Sw.e.]

3667. Der Forstreichtum der Rumänischen Volksrepublik. [Forest resources of the Rumanian People's Republic.] *Wald* 2 (3), 1952 (79). [G.]

Translation from the Rumanian journal *Parallèle* 50, giving some current figures on forests and wood industries.

3668. The forest resources of New Hampshire. *For. Resour. Rep. U.S. For. Serv.* No. 8, 1954. pp. 39 + map. Price 45 cents.

3669. GUILKEY, P. C., GRANUM, B., and CUNNINGHAM, R. N. Forest statistics for Minnesota 1953. *Sta. Pap. Lake St. For. Exp. Sta.* No. 31, 1954. pp. 36.

Results of the most recent survey are given and compared briefly with those for 1936.

3670. KISSIN, I. A situação madeireira da Amazônia (um estudo preliminar). [The timber situation in the Amazon region—a preliminary study.] Banco de Crédito da Amazônia S.A., Belém (Pará). 1952. pp. 118. [Port.e.]

A comprehensive study of the timber situation in the Brazilian Amazon. The main body of the paper is divided into 2 parts: (1) dealing with the State of Amazonas and the neighbouring territories of Acre, Guaporé and Rio Branco, and (2) the State of Pará and the territory of Amapá. In each case the timber situation is reviewed in its various aspects, including total and regional production, extraction and transport of logs, existing sawmills and their equipment, operation and output, production of hewn sleepers, costs of production (including taxes etc.) of sawn timber and logs, prices, freight rates and exports to home and foreign ports. A separate note gives a brief review of relevant research and publications, and of afforestation activities by public and private agencies. A list is also appended showing the scientific names of trees and other plants mentioned in the body of the report. *From author's summary.*

906. Direct Economic Significance of Forests (Position of Forests and Forestry in the National Economy)

3671. HEIKINHEIMO, L. Sahatavaran vientitulon jakaantumisesta vuosina 1913-1953. [The distribution of income from Finnish sawn timber exports in the years 1913-53.] *Acta for. fenn.* 61 (19), 1954. pp. 24. 18 refs. [Fie.]

An attempt is made to study the development of a logger's daily earnings, a sawmill worker's hourly earnings, sawtimber stumpage prices, and sawn timber export prices, expressed in Finnish marks, from 1913 to 1953. Tables and graphs have English as well as Finnish legends.

907. Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)

See also section 116.

3672. Proceedings of the third international conference for the protection of the fauna and flora of Africa, Bukavu, 26-31 October, 1953, Belgian Congo. Commission for Technical Co-operation in Africa South of the Sahara. [1954?]. pp. 571. [F. or E.]

Contains: the London Convention for the preservation of fauna and flora, 1933, with the resolutions proposed in amendment of it and of its schedule of protected animals and plants; general resolutions; papers presented on conservation, control, research and general matters; and a comparative statement by countries of the present position under game reserves; exploitation, conservation and management; control and game departments; fishing; protection of vegetation (forest departments, forest reserves, legislation); and scientific studies.

3673. MOREL, H. Notes sur la protection de la nature aux États-Unis. [Notes on the protection of nature in the U.S.A.] *Ann. Éc. Eaux For. Nancy* 14 (1), 1954 (1-40 + 7 photos). 42 refs. [F.e.g.]

Describes the National Park Service, and gives an account of some of the National Parks with notes on the Fish and Wildlife Service.

3674. COSTELLO, D. F., HILL, R. R., and HICKIE, P. The integration of professional forestry, range management, and wildlife management responsibilities. *J. For.* 53 (1), 1955 (58-62).

Report of the committee appointed to advise on the integration of management and research in wild life with those of the other branches of multiple-use forestry. The points covered are: a statement of the problem; the interested parties; research; administration; methods of integration; conclusions.

3675. ARNST, A. Recreational facilities: a potent relations force in forestry. *J. For.* 52 (12), 1954 (910-3).

Warns private forest owners of the serious political pressures they may evoke by following policies counter to the public's view on access to forests, and exhorts them to follow the psychologically profitable way of the U.S. Forest Service in providing recreational facilities. Details of the U.S. Service's and some private interests' efforts are given in visitors, acreage and camp accommodation.

908. Relationship to Other Branches of Husbandry and Industry

See also No. 3674.

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3676. PEREZ ARBELAEZ, E. La hidroelectricidad en Colombia en relación con los recursos naturales. [Hydroelectric schemes in Colombia in relation to natural resources.] [Proceedings.] Technical Meeting, International Union for the Protection of Nature, Caracas 1952, 1954 (254-62). [Span.]

Reviews present and future progress of hydroelectric schemes in Colombia, and their influence on natural resources. Most important is the past, and probable future, reduction in the exploitation of timber for charcoal burning.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 2587, 3025-6, 3629, 3665.

3677. STAMP, L. D. *Man and the land*. New Naturalist, London. 1955. pp. 272 + 56 plates. 5 pp. of refs. Price £1. 5s.

An assessment of man's influence on the face of the land in Britain and on its animal and plant communities from prehistoric times to the present day, including chapters on native and exotic trees and afforestation since 1919.

3678. Afforestation in Portugal. Expenditure of £5,800,000 projected under six-year plan. *Timb. Tr. J.* 212 (4090), 1955 (77). 1 ref.

Notes on the financing of the plan, local forests, policy and exports, from the latest Board of Trade's *Economic Survey of Portugal* (H.M. Stationery Office, price 4s. 6d.).

3679. HARA, K., and HIRAMATSU, O. [On the effect of range and coppice in national forest on the economy of a mountain forest [village].] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 74, 1954 (117-48). [Jap.e.]

Shows the greater profitability of coppice (for charcoal) over range management for horsebreeding in the economy of a mountain village. Local farmers should turn to cattle for draught purposes, meat, and farmyard manure. *From authors' summary.*

3680. PLATEAU, H. La protection de la nature et défense du sol marocain. [Conservation and soil protection in Morocco.] *Terre maroc.* No. 201, 1954 (467-79). [F.] E.M.B.

Includes an account of vegetation and soil destruction in Morocco during historical times; words of advice to cultivator and herdsman on soil and pasture protection; the place of forestry; and overstocking and wind erosion.

3681. [Incidence of forest destruction by farmers.] *Rep. For. Dep. Gold Coast, 1953/54, 1954* (1-2, 11).

Approximate areas in the Gold Coast in sq. miles are (a) rain forest, 2740; (b) *Lophira/Triplochiton*, 3000; (c) *Celtis/Triplochiton*, 14,690; (d) *Antiaris/Chlorophora*, 9705; (e) coastal scrub and grass, 1895; (f) Guinea Savanna, 58,815; (g) Strand and Mangrove, 998. Most of the timber comes from (c), (b) and parts of (d), the first being the richest in the chief species now exported. This association contains also the most sought-after Cacao soils and, as a result, the only large continuous unreserved forests

lie in the inaccessible areas west of 2° 30' W. The statement in last year's report that 780 sq. miles of forest were destroyed annually is now modified as 'areas of forest averaging 780 sq. miles annually had become so honeycombed by farming as to render them useless for organized timber exploitation'. Actual clearings may be 30-80% of this area. Improved access accelerates destruction, the spread of which is ribboned along new roads, while concession areas are being abandoned because of the difficulty of extraction over farm land.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

See also No. 3665.

3682. SILVY-LELIGOS, P. Étude forestière d'une commune lorraine: Viterne (Meurthe-et-Moselle). [Forestry study of a Lorraine commune: Viterne (Meurthe-et-Moselle).] *Rev. for. franç.* 7 (2), 1955 (95-104 + 5 photos + 1 map). [F.]

3683. VENET, J. Une commune forestière bien vivante: Liffol-le-Grand. [A forest commune that is very much alive: Liffol-le-Grand.] *Rev. for. franç.* 7 (2), 1955 (105-7). [F.]

Compares the prosperity and well managed communal forest of Liffol-le-Grand with the dwindling population and under-utilized communal forest of Viterne. [Cf. preceding abstract.]

3684. BLACKWOOD, R. C. An estate's forest history (Eliock, Dumfriesshire). *Scot. For.* 9 (1), 1955 (13-21).

3685. Reports on 'small woods': Ireland. [Docum.] *European Forestry Commission, 7th Session, 1954*, No. FAO/EFC/70-F, 1954. pp. 4. Limited distribution.

3686. Reports on 'small woods': Sweden. [Docum.] *European Forestry Commission, 7th Session, 1954*, No. FAO/EFC/70-E, 1954. pp. 5. Limited distribution.

3687. Reports on 'small woods': Netherlands. [Docum.] *European Forestry Commission, 7th Session, 1954*, No. FAO/EFC/70-G, 1954. pp. 7. Limited distribution.

3688. Rapports sur la 'petite forêt': Grèce. [Reports on 'small woods': Greece.] [Docum.] *European Forestry Commission, 7th Session, 1954*. No. FAO/EFC/70-R, 1954. pp. 4. [F.] Limited distribution.

3689. Rapports sur la 'petite forêt': Yougoslavie. [Reports on 'small woods': Jugoslavia.] [Docum.] *European Forestry Commission, 7th Session, 1954*, No. FAO/EFC/70-J, 1954. pp. 3. [G.] Limited distribution.

3690. Reports on 'small woods': Canada. [Docum.] *European Forestry Commission 7th Session, 1954*, No. FAO/EFC/70-S, 1954. pp. 2 + 1 tbl. Limited distribution.

3691. SKOK, R. A., and HALL, O. F. Amount and distribution of farm forest income in Minnesota. *Minn. For. Note* No. 38, 1955. pp. 2.

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93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

3692. Defensa y fomento de los bosques en Colombia. [Protection and development of forests in Colombia.] *Agric. trop., Bogotá* 10 (9), 1954 (27-32). [Span.] A.P.B.

A discussion and criticism of Decree No. 2278 of 1953, governing the classification and protection of the Colombian forests, reforestation and education in forestry.

3693. DUFREST, J. Pylones et forêts. [Pylons and forests.] *Chêne-Liège* Nos 1501-1502, 1954-5 (29-31; 27-9). 4 refs. [F.]

Summarizes the legal position in France (charges, authorization, responsibility for damage, compensation) with reference to power-line rights of way.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

945.3. Education. Training

See also Nos. 3632, 3695.

3694. McEWEN, J. The education of working foresters. *Scot. For.* 9 (1), 1955 (6-12).

Surveys existing facilities in Scotland, points out their deficiencies, and suggests improvements.

945.4. Research

See also Nos. 2681, 3632.

3695. AGGARWAL, K. L. Forest education and research in India. *Indian For.* 80 (12), 1954 (736-41 + 4 plates). (4th World Forestry Congress, 1954.)

3696. KADAMBI, K. Progress of silvicultural research in India. *Indian For.* 80 (12), 1954 (798-803 + 3 plates). (4th World Forestry Congress, 1954.)

Briefly reviews the history of the Silviculture Branch of the Forest Research Institute, Dehra Dun, its development, achievements and current problems.

3697. Directory of current woodlands research and experimental work in the Canadian pulp and paper industry. Pulp & Paper Research Institute of Canada, Montreal. 1954. pp. 187.

Looseleaf pages, supplementing and revising the directory for 1953 [see *For. Abstr.* 15 (No. 3160)]. Fifteen projects have been deleted as discontinued or no longer current, and reports on 64 have been revised. The revised directory comprises 246 projects undertaken by the Institute, the Canadian Pulp and Paper Association and 29 pulp and paper companies. There is a revised index.

3698. Forest research in New England. *Bull. Northeast. Wood Utiliz. Coun.* No. 42, 1954. pp. 64. 15 refs. P.R.

A report of the sub-committee on forest research (H. I. Baldwin, chairman); includes groups reports on: silviculture (D. M. Smith); forest genetics (H. Nienstaedt); physiology of forest trees (T. T. Kozłowski and D. M. Smith); forest soils (H. A. Lunt); forest influences (D. M. Smith); forest management (V. S. Jensen); forest mensuration (H. E. Young); forest protection (D. M. Smith);

forest insects (R. C. Brown); forest diseases (J. R. Hunsbrough); forest utilization (C. R. Lockard and F. C. Simmons), and wood-using industries (E. D. Gruen).

3699. CASSADY, J. T., and MANN, W. F., JR. The Alexandria Research Centre. Southern Forest Experiment Station, New Orleans. 1954. pp. 49.

An account of research at the Centre, which serves parts of Louisiana and Texas, on afforestation, improvement of existing stands, managing Pine plantations for optimum returns, and improving management of livestock and forage on forest ranges.

946.1. Associations, Societies

See No. 3632.

946.2. Conferences and Excursions

3700. TERWAGNE, C., BUZON, G., and GALOUX, A. La Forêt de Hertogenwald et les Hautes Fagnes (excursion annuelle du 20 au 22 juin 1954). [The forest of Hertogenwald and the Hautes Fagnes (Annual excursion of Belgian Forestry Society, 20-22 June 1954).] *Bull. Soc. for. Belg.* 62 (2), 1955 (73-126 + 10 photos). [F.]

The subjects of study included: natural regeneration of Beech, Beech/conifer mixtures, natural regeneration of Spruce, exotic species suited to the Ardennes, conversion of coppice to Beech high forest, protection of plantations against game, preparation of marshy areas for planting, and Scots Pine provenance.

95. FOREST TAXATION

See also Nos. 3292-3, 3630.

3701. SELIN, L. Metsätaloutemme verotetut tulot vuosina 1950-53 erään laskelman valossa. [Forestry income taxed in Finland in 1950-53 in the light of a calculation.] *Acta for. fenn.* 61 (32), 1954. pp. 16. 10 refs. [F.e.]

Explains the difficulty of ascertaining the amount of tax paid on forestry in Finland, owing to the close connexion of forestry and agriculture, and the method by which the author has extracted the figure from statistics now available. The tables have English legends.

3702. OSARA, N. A. Valtion metsämaiden verotus. [Taxation of State woodlands.] *Acta for. fenn.* 61 (29), 1954. pp. 14. [F.e.]

In Finland the state has to pay local government taxes on its forest property, but the state tax on income and property is not collected, as the corresponding amount goes directly to the Treasury in the form of a state forestry surplus. The author calculates the probable amount of tax payable on state forests if such tax were collected and shows that it could easily be met from the annual forestry surplus.

3703. HAGENSTEIN, W. D. Trees and taxes. *J. For.* 52 (12), 1954 (902-4). 7 refs.

[Cf. *For. Abstr.* 14 (No. 1851).] Discusses the objections to present and past taxation systems in Washington and Oregon, where forest industries support 50% of the economy, and where the better

half of the timber-growing capacity is in private ownership. The author considers that ultimately the only fair method of taxation under the *ad valorem* system or a substitute for it, is one on the timber-producing capacity of the land, paid either annually or at felling.

96. FOREST LABOUR QUESTIONS. LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

See also No. 3671.

3704. PIHA, A. Työpanos maatilametsätaloudessa. [The labour requirements in estate and farm forestry.] *Acta for. fenn.* 61 (31), 1954. pp. 23. 18 refs. [F.g.]

Presents and discusses tabulated data for Finland. In general, the comparative requirements per ha. per annum in man-days, for forest and for agricultural land respectively, are: 0.9 and 2.85 regular workers, and 0.5 and 1.59 casual workers, total 1.40 and 4.42. Tables have German legends.

3705. HELLÉN, E. Sosiaaliministeriön tilasto metsätyöntekijäin ansioista ja palkoista. [Statistics of the wages and earnings of forest workers [1900-1953, in Finland] prepared by the Ministry of Social Affairs.] *Acta for. fenn.* 61 (30), 1954. pp. 10. 10 refs. [F.e.]

Tables have English legends.

3706. Woodlands feeding conference papers. *Pulp Paper. Mag. Can.* 56 (1), 1955 (107 . . 144). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* Nos. 1429 to 1438.)

Covers storage, transport, accounting, packaging, refrigeration and catering. The Canadian Paper industry consumes 8000 tons of meat, 11,000 tons of

potatoes, 7500 tons of flour and 300 tons of cheese for which it pays \$7,000,000 annually.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. Congresses, Conferences

See also Nos. 3615, 3672.

3707. MÉTRO, A. Compte rendu du congrès de l'*Eucalyptus* au Maroc. [Report on the *Eucalyptus* congress in Morocco.] *Comptes Rendus, Société des Sciences Naturelles et Physiques du Maroc* No. 7, 1954 (161-5). [F.]

Includes notes on the suitability of species for the diverse climatic and edaphic conditions of Morocco and recommendations for continued cooperation and lines of enquiry to be taken up by the Mediterranean countries which took part in this congress of Oct. 1954 under F.A.O. auspices. [Cf. *For. Abstr.* 12 (No. 238); 15 (No. 2407).]

972. Organizations

3708. Activities of FAO under the expanded technical assistance program 1953/54. FAO, Rome. No. FAO/54/11/6752, 1954. pp. 80 + 3 dgms. Cf. *For. Abstr.* 13 (No. 4484).

3709. E.C.E. Timber Committee. *Timb. Tr. J.* 212 (4090), 1955 (81-2).

A detailed account of the structure, powers, *modus operandi* and useful results of the work of this Committee (Economic Commission for Europe). Its production and trade statistics published since 1947 are the most comprehensive available. The market reports, involve useful exchanges of confidential information.

FORESTRY THE WORLD OVER

References: 1. *Az Erdő*, Budapest; 2. *FAO Press Release*, Rome; 3. *Forestry News of Latin America*, Rio de Janeiro; 4. *India News*, London; 5. *Journal of Forestry*, Washington; 6. *Manchester Guardian*, Manchester; 7. *Nature*, London; 8. *New Hungary*, London; 9. *NRC Research News*, Ottawa; 10. *Quarterly Journal of Forestry*, London; 11. *Skogen*, Stockholm; 12. *Timber Trades Journal*, London; 13. *Times*, London; 14. *Trees*, Cleveland, Ohio.

International.

FAO. Experts from France, Norway, the Soviet Union, and Western Germany, held a 4-day meeting at Geneva in April under the auspices of FAO and ECE, at which they agreed on the technical and practical requirements of forest tractors, and recommended principles for their testing. Agreement was reached on such matters as the cross-country ability of tractors, their turning radii, their ability to work on slopes, and the performance of winches (the direction in which cables should go, their speed, pulling power, and control). A system of standard testing methods for forest tractors has been worked out and work is continuing on such questions as the length of service that should be required before a breakdown. They also agreed on a final scheme for calculating operating costs of forest machines, including tractors, motor saws, and other equipment (2; 30.4.55).

FAO Conferences.

	1955
FAO/EFC Conference on Forestry Statistics	September
Latin-America Forestry Commission 5th Session	September
International Chestnut Commission	September
Geneva	
Venezuela	
Rome	

Canada. A Muskeg Research Meeting was held on 2 March 1955 at Edmonton, Alberta. Topics discussed included methods of building roads for primary and secondary access over muskeg in forestry practice (9; March 1955).

Chile. A forest training and demonstration centre has been set up at Llanacura, under an agreement between the Chilean government and FAO, by which FAO contributed the necessary machinery and equipment (3; 1.4.55).

Great Britain. The Forestry Commission has started what is known as the "Forest Plots Adoption Scheme." Conservators in various parts of the country have been able to offer to schools situated within easy reach of State forests a plot of 2-3 acres for adoption. The children, under the guidance of their teachers, can visit the plot at regular intervals and carry out various forest operations, such as clearing the ground, planting, and tending young trees. A number of such plots have already been adopted. On the Strouden Park owner-occupier estate in Bournemouth, said to be the only one of its kind in the country, the City Council has accepted a suggestion that the trees planted along the roads on this small estate should be adopted by the children who live there. In all, about 70 trees will eventually be supplied by the City Parks Department, and at a ceremony in January (televised by the B.B.C.) the first four were planted. Each tree was adopted by 2 children living near by, whose names are borne on a plaque attached to the tree, and they will be responsible for its care and protection. At Harlow New Town, where some 50,000 existing trees are being preserved, and nearly 100,000 new trees and shrubs have already been planted, the problem of ensuring their protection and preservation has been tackled by the creation of a new organization called "Park and Forest Rangers." Members promise "as young citizens of Harlow to protect the woods, trees and green places and the birds and animals in them from all who would thoughtlessly harm or destroy them." Those making this promise pay a membership fee of 3d. and receive a buttonhole badge and an attractive certificate embodying the corporation's arms and the Ranger's promise. The response has been overwhelming, and the membership to-day stands at nearly 2500 (10; April 1955).

The Finance Committee of the Timber Development Association has approved the terms on which the government will make a grant of £14,000 a year for research, provided that the Association itself finds £28,000 a year (12; 9.4.55).

The life of timber used in British mines is only 18 months, and if only 10% of Britain's pitprops were impregnated with fire retardants it would save the country £130 millions every 10 years, apart from a vast saving in labour. This was stated at a meeting of production managers and engineers for north-western collieries (6; 15.4.55).

Hungary. Short films dealing with silvicultural practices are to be included in newsreels about every three months.

The new Hungarian Directorate of Forestry was placed under the direct supervision of the Premier's office and will henceforward operate independently of the Ministry of Agriculture.

A ministerial decree has made the co-operative collection of brushwood in felled areas compulsory.

Six million Norway Spruce seedlings are being distributed for planting along streets and squares and for planting on private estates (1; 1954).

Tinsel made of glass filaments is being used to protect young Pines from damage by wild animals. Tested at the Kapoevar forest farm it proved so successful that it is to be used extensively (8; April 1955).

India. Special efforts are to be made to develop the forests and forest industries of India during the second 5-year plan. In connexion with the supply of raw materials for the paper, match, and plywood industries, it is proposed that: (1) certain forest areas be reserved for the paper industry, and long-term leases be granted for working them; (2) a rational method of price fixing be adopted; and (3) roads be developed in such forest areas to facilitate extraction. The Government of India is considering the question of setting up a Forestry Commission to scrutinize major working plans, collect forestry statistics, pool technical information, and undertake extension work (4; 21.5.55).

Israel. The nucleus of a forest of 250,000 Pine trees was planted on 3 May on 250 acres of Galilean hillside overlooking the valley of Jezreel, to commemorate the coronation of Queen Elizabeth II. The trees, most of which come from Cyprus, are the gift of British Jewry, and the land was provided by the Jewish National Fund, under the sponsorship of which many thousands of acres of forest have been planted in Israel (13; 4.5.55).

Northern Ireland. The first forest park in Northern Ireland, Tollymore Park in County Down, will be open to the public from May 1st. It covers an area of 1200 acres at the foot of the Mourne Mountains. The decision to create the Park was taken under the Forestry Act (Northern Ireland) 1953, which empowers the Ministry of Agriculture to declare that any land owned by the Ministry shall be treated as a forest park, to which the public shall have access in accordance with by-laws. The Ministry proposes to open the Park to camping parties from youth organizations, and there will also be parking sites for about 20 caravans (7; 23.4.55).

Scandinavia. An investigation into the life history of *Hylobius abietis* has been started in Scandinavia and will last until 1959. Brood logs 1 m. long, of Pine and Spruce alternately, are buried in the ground at an angle, with the small end down and the butt just above the surface; they will be examined twice yearly and the larvae present counted and preserved. There are 33 sites selected for the experiment, between the Arctic circle and the Danish/German frontier, and between the Atlantic and the Karelian border; 80 logs will be used at each site N of 66° and at those N of 62° lying 400 m. above sea level, the number being reduced in the sites further south (11; 1.5.55).

U.S.A. In the year ending 30 June 1954, forest and shelterbelt planting in the U.S.A. amounted to 811,066 acres, of which 687,338 was on privately owned, 73,017 acres on federally owned, and the remainder on other public lands. Industrial companies owned 46% of the private land involved (5; May 1955).

A treatment for Dutch Elm disease, Elm phloem necrosis and Oak wilt has been developed by Dr. H. D. Salins of the Flax and Fiber Institute. Kemosol, a solution of gaseous N in a colloidal organic solvent, is applied from a container at the first fork of the tree through a tube penetrating to the heartwood. It is believed that the liquid acts as a solvent and catalyst and reverses the blocking action of the disease organisms (14; July/August 1954).

FORESTRY

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